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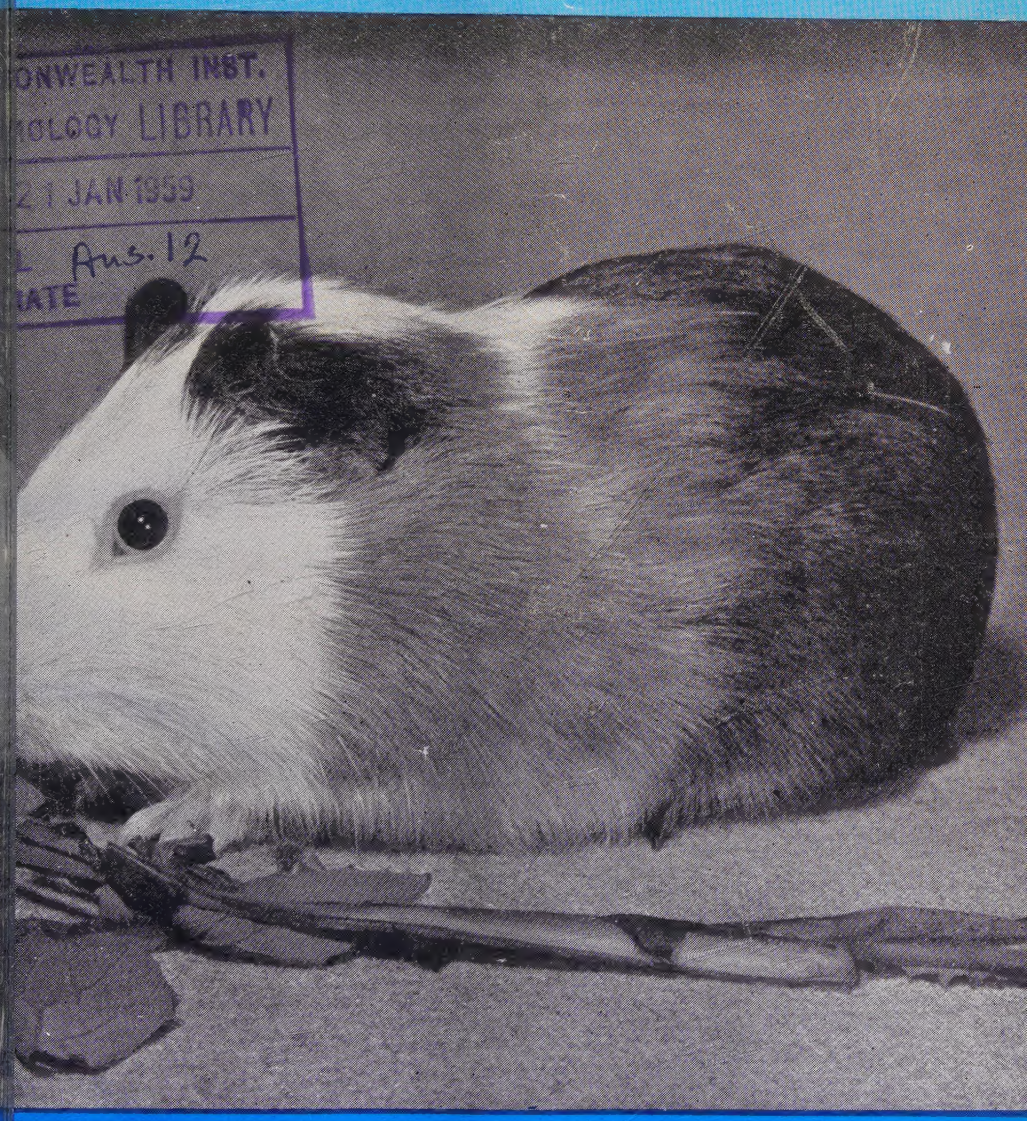

GUINEA PIGS MAKE GOOD PETS.

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Irrigated Pasture All the Year

By C. A. SCHRODER, Assistant Irrigationist.

Top quality pasture can be grown all the year in temperate areas if suitable land and water for irrigation are available.

For more than 10 years now, at the Gatton Regional Experiment Station, dairy cattle, beef cattle and flocks of sheep and lambs have had ample supplies of highest quality irrigated pasture available to them at all seasons of the year.

There need be no failure. The pasture has been there regardless of climatic conditions, though of course the seasonal growth rate does vary. In spring, in summer, in autumn and in winter alike, the livestock have had access to the very highest quality pastures. By this means animal production has been maintained at a very high level at all times.

Such results have not just been obtained for one year but have been maintained year after year.

All that is necessary to maintain these pastures on good land in temperate areas is average skill as a farmer, and the availability of a suitable water supply for irrigation. If a farmer has these requirements on his own property he can repeat what is being done regularly at the Gatton Regional Experiment Station. Top quality pasture, then can be available whenever it is desired.

Irrigation is Essential.

It must be remembered, however, that irrigation is essential. And what is really important is that water must be applied at the right time and in the correct quantity to meet the needs of the pasture.

Plate 1.

High Quality Irrigated Grass and Clover Pasture in May. Gatton Regional Experiment Station.

Time and rate of application will vary according to season, and soil and pasture types. Unless proper irrigation practice is followed satisfactory results will not be obtained except in a season when the rainfall is particularly favourable for the maintenance of growth.

We need to remember, however, that many years of experience have taught us that such seasons occur only rarely. We cannot rely on them. If we try to do so we will be let down and our stock will be let down too. The end of it will be poor pasture results and a severe shrinkage of income.

Should a farmer be contemplating an area of irrigated pasture, the first step is to make sure that he has suitable water and land for the job. If he has any doubts about this he should consult his nearest district Adviser in Agriculture, who will readily give much helpful advice.

Determining Pasture Mixture.

Seasonal availability of pasture is governed largely by the species employed in the planting mixture. For this reason the choice of components should be made carefully.

Having decided that suitable water and land are available the next question to be settled is "At what time of the year is the irrigated pasture required?"

The answer to this question will vary according to the district and the farmer's own particular conditions. Maybe some would desire to have supplementary irrigated pasture in the late autumn/winter period, others in spring, others again in summer. Maybe some would like to have it all the year round.

When it is decided at what period the pasture is required then the working out of the actual seeding mixture can be done. Here again the local agricultural officer will be able to give much valuable advice.

There are some points which are important everywhere and these must be kept in mind.

It must be remembered, particularly, that good pastures can result only when based on suitable well nodulated legumes—these supply a heavy body of highly nutritious pasture. At the same time they have the ability, when properly managed, to collect large quantities of nitrogen from the air and place it at the disposal of associated grasses. Well managed white clover under irrigation can add annually to an acre of soil as much nitrogen as is supplied by 10 cwt. of sulphate of ammonia.

Therefore make sure to choose the most suitable legume.

Then comes the choosing of one or more grass species. Select the grass or grasses according to the period that the pasture is required, for example, perhaps paspalum for spring/summer, or short rotation rye grass for autumn/spring.

The major factors to keep in mind in determining the seeding mixture are:—

1. See that all species selected are compatible in climatic requirements. For example, do not generally combine a species that grows in hot weather with one that grows in cool periods only. In this respect rye grass and paspalum are not compatible. However, there are times when under special circumstances even opposites may be combined.

2. Do not include in a mixture any species that is either much more or much less palatable than others. Obviously, the one would be overgrazed and soon eaten right out while the other would be avoided and thus remain to become the dominating component.

3. See that vigour and habit of growth of the components are compatible. For example, Ladino strain of white clover is taller growing than Irrigation strain and also makes faster summer growth. It combines admirably with summer growing grasses such as paspalum, Rhodes or *Phalaris arundinacea*. However, on the Regional Experiment Station it has

been found that it will quickly and completely suppress cocksfoot or rye grasses.

On the other hand the Irrigation strain of white clover combines well with the temperate grasses but not so well with the vigorous summer ones.

Mixtures used at Gatton.

Mixtures favoured at the Gatton Station are given here as a guide and will need modification for other parts of the State:

1. Pasture to provide feed in spring, summer and autumn.

	Per acre.
Paspalum	8 lb.
Ladino white clover ..	2 lb.
Or—	
Rhodes grass	5 lb.
Ladino white clover ..	2 lb.

2. Pasture to provide feed chiefly during November-March.

	Per acre.
Phalaris arundinacea ..	8 lb.
Ladino white clover ..	2 lb.

3. Permanent pasture, producing chiefly in April-December period.

	Per acre.
H1 rye grass	2 lb.
Cocksfoot	4 lb.
Irrigation white clover	2 lb.

4. Winter pasture. Annual type, providing feed from early May to October.

	Per acre.
Wimmera rye grass ..	4 lb.
Yarloop sub-clover ..	4 lb.
Clare sub-clover ..	4 lb.

5. Perhaps it may be desired to have a pasture combining various species to extend active production over as much of the year as possible.

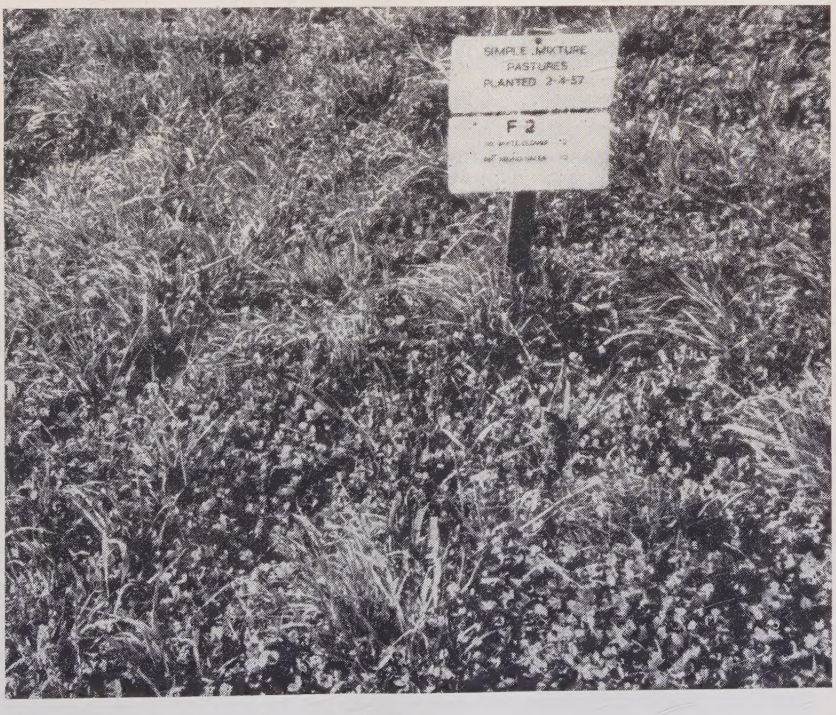


Plate 2.

Phalaris arundinacea and White Clover Pasture in January Showing Growth 17 Days after Grazing. Yield of forage, 4 tons per acre.

Plate 3.

Para Grass and Strawberry Clover Pasture is Highly Productive and Allows Use of Low Lying Land and Run-Off Water. Photograph taken in April.

If so, then the following mixture may be considered:—

	Per acre.
Irrigation white clover	2 lb.
H1 rye grass	2 lb.
Phalaris arundinacea ..	4 lb.
Cocksfoot	4 lb.

Satisfactory persistence of all these species when sown together cannot be maintained for more than a couple of years.

When irrigated pastures are required all the year round, it is considered more desirable to grow a series of simpler mixtures than to employ a highly complex one.

6. Many properties have problem areas where it is necessary to devise a mixture to suit the special conditions.

Here it may be necessary to do things that would not be done in normal circumstances.

At the Regional Station at Gatton there are several low areas where surface drainage is unsatisfactory.

Excellent results have been obtained in these areas by employing a mixed pasture of para grass and strawberry clover. Koniak Palestine strain has proved the best strawberry clover in this association.

7. No mention has been made of the fairly new Priebe perennial prairie grass.

This grass is now in its second year of trial at the Station and is showing very good promise. It is persisting very well towards the end of the second summer. It combines well with Irrigation white clover. It is essentially an autumn and spring grower though indications are that it will produce longer into summer than H1 rye grass.

From present appearances this grass could be used in the same way as H1 rye grass and though less succulent may prove to have some valuable characteristics.

Such mixtures as are quoted offer a wide selection.

A mixture can be determined that will provide pasturage at any particular period. However, by growing a series of two or more mixtures a farmer can arrange to have succulent nutritious pasture available throughout the year if this is desired.

Farmers' Groups are Making Silage

By G. W. MARLOW, Cattle Husbandry Branch.

At least 42 farmers in the Wide Bay area are co-operating in district groups to conserve ensilage from crops sown after the 1957 drought.

Silage is being made by co-operative effort between farmers at Cooroy, Dagun, Cedar Pocket and Green's Creek, Goomong, Gootchie, Gunalda, Kanyan, Kenilworth and Ridgewood areas. All the properties are dairy farms.

Sharing of labour and machinery is helping to keep down harvesting costs.

It is expected that 7,000 tons will be harvested.

A Typical Group.

Typical of all these groups is the Cedar Pocket-Green's Creek group, where crops of sweet sorghum (Sugardrip variety) are being stored at an overall cost of £2 15s. a ton of green material in the trench.

This group consists of four farmers. Each planted a small acreage of Sugardrip sweet sorghum in 28 in. rows at varying seeding rates from 7 to 12 lb. per acre. One bag per acre of 10:10:0 fertilizer was used, and plantings were staggered to spread harvesting time.

A row crop engine-functioned forage harvester is doing the job of harvesting by contract. This machine is owned and operated by the local milk processing firm, which also supplies two specially designed trailers for silage handling.

Tractor power is arranged by the farmers themselves. One farmer owns a 35-h.p. crawler tractor with which he delved the trenches for the others. This tractor was also used to pull the harvester. This was necessary because

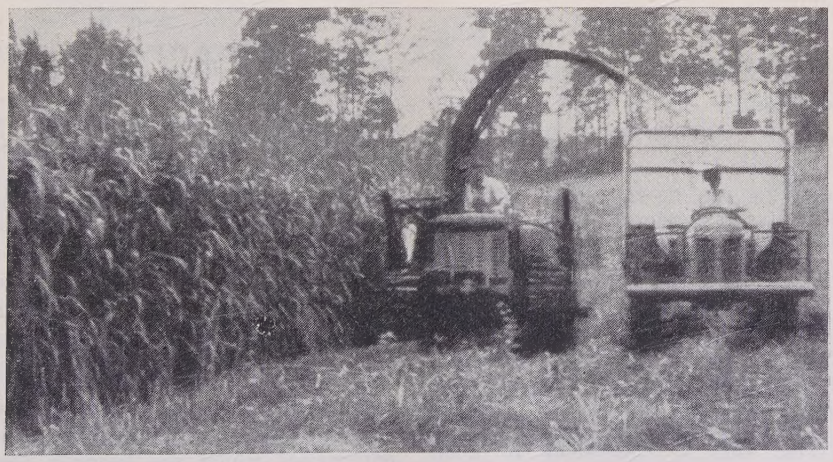


Plate 1.

Crawler Tractor and Forage Harvester in a Crop of Sweet Sorghum.

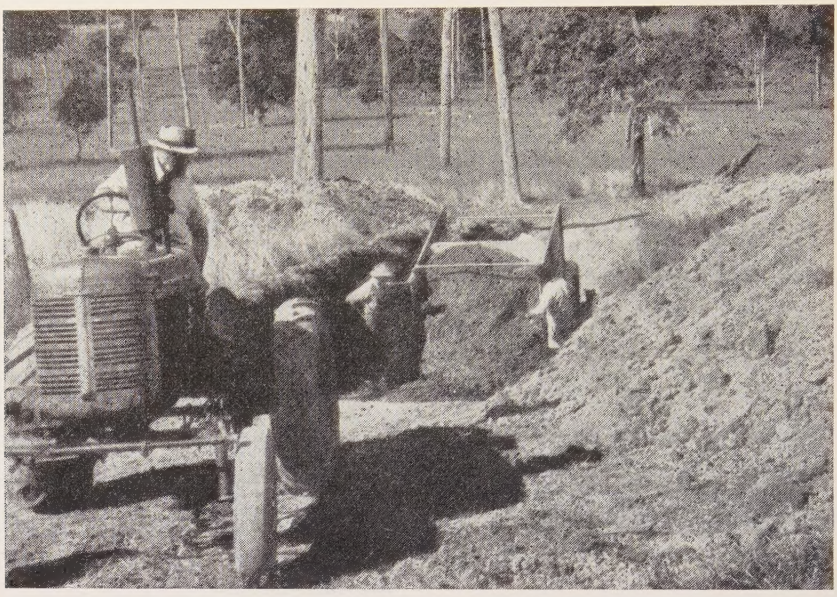


Plate 2.

Unloading Silage Into the Trench.

of steep grades and wet field conditions. Ordinarily, the machine can be hauled by a lighter, wheeled tractor.

Calculation of Costs.

On one farm where the work has been completed, the owner has made available the costs. He planted six acres of Sugardrip sweet sorghum in January.

	£	s.	d.
Land Preparation ..	15	15	0
Seed	9	0	0
Fertilizer	11	1	5
Trench	21	0	0
Crawler Tractor for Harvester	20	0	0
Harvester at 7s. 6d. per ton	14	18	9
Miscellaneous fuel costs (rolling pit, &c.)	8	0	0
Total	99	15	2

Time taken—20 hours.

Tonnage at 56 cubic ft. per ton—40 tons.

Cost per ton—£2 15s.

This cost is equivalent to good oaten hay at £8 5s. a ton landed on the farm on a food unit basis.

These are reasonable costs, especially when the potential of silage is considered. In this district, silage is being used to provide a maintenance and steaming-up ration for cows which will be grazing irrigated pasture. It does two important things. It prepares the cows for high milk production when they calve and ensures that they are not using expensive irrigated pasture for maintenance purposes. It can also be used on "dry" farms as a supplement to high protein winter forage crops.

So far two results have been observed on farms where silage has been used in fairly recent years. They are, first, a cow fed silage prior to calving and in early lactation gives more milk for a longer period of time, and second, high protein irrigated pasture is balanced to give better milk and cream production for the same amount of pasture consumed.

Wide Bay area farmers are to be congratulated on their co-operative enterprises which are keeping down costs and improving production per cow.

Farm Wisdom

THE main objections to irrigation are usually aimed at the high costs. This is a debatable question, however. In the first place we have to consider the water supply. One of the cheapest water sources I have seen in practice, is a 200,000-gallon dam built at a cost of £35 on a flat alongside a permanent creek, and gravity fed from that same creek through an earth ditch. Not too many, however, are so fortunate. Up to a point the Condamine offers similar conditions, that is if the river keeps flowing sufficiently. Another water source is the dam, often doubtful and usually fairly expensive. The most reliable water source is the bore or well. With depth, size, and type of pump, costs vary considerably.

The best thing in this case would be to give you a practical example. A plant capable of supplying water to flood irrigate 75 acres has been established at the cost of some £2,000. This includes everything to make the water come out of the supply pipe into the main ditch.

Land preparation costs for flood irrigation were negligible compared with the supplying costs, due to the fact that they only consisted of costs for tractor fuel and wooden irrigation boxes.

Lucerne was grown and, with the regularity of a clock, every 6 weeks, all through the drought, produced a cutting. And the yields? Up to 40 bales per acre and an average of 25. And heavy bales they were too! The total costs to produce a bale have varied from 4s. 6d. to 7s.. If we stick to an average of 6s. per bale, irrigated lucerne under normal conditions is still an attractive proposition. And during a drought?—well! And who would be really able to value the security of a permanent water supply?

—L. E. BRANDS,
Adviser in Agriculture.

REDUCED to its essentials, soil conservation calls on the farmer to apply six simple principles. You can think of these principles as consecutive steps to lead the water into your soil and to carry the surplus safely away.

The first and most important step is to get maximum penetration of rain through the soil surface, and your next is to make sure it can penetrate rapidly. These aims will be achieved by keeping crop residues on the surface and by ripping the soil. The third step is to use contour cultivation to pond as much rain as possible where it falls. Contour banks spaced at intervals down the slope and well-grassed waterways are the fourth and fifth steps and are designed to lead the water safely away. The final principle is to trap as much rain as possible in dams adjacent to the waterways.

—J. E. LADEWIG,
Chief Soil Conservationist.

DURING their short establishment stage, newly-planted irrigated pastures often need fertilizer. On soils of low to moderate fertility, light dressings of nitrogen-rich fertilizer will increase the vigour of a young pasture, especially the vigour of the grass components.

This increased vigour speeds up the formation of a complete ground cover and permits earlier grazing.

For a young pasture that needs fertilizer a nitrogen-rich mixture of ¾ to 1 cwt. per acre is recommended. If required, a similar dressing may be given six to eight weeks later. The rate and number of applications will vary according to the soil type, land preparation methods and the pre-cropping history. Be guided by the advice of your local Adviser in Agriculture or the recommendation of your nearest Regional Experiment Station.

—A. NAGLE,
Irrigationist.

THE following facts about cotton will prove useful to farmers going in for this crop:

1. The Federal Government guaranteed price has been extended for a further five years to cover crops up to and including the 1962-63 crop.

2. The guaranteed price is an average of 14d. per lb. for cotton produced above the grade of Strict Good Ordinary.

3. Australian spinners import between 80,000 and 90,000 bales of raw cotton per year.

4. Australian production has been between 2,000 and 3,000 bales a year over the last few years.

5. Yields from both rain-grown and irrigated cotton over the last 10 years have averaged 370 lb. and 838 lb. per acre respectively. Comparative figures from the Biloela Regional Experiment Station over a range of varieties are from 1,048 to 1,095 lb rain-grown and 1,512 lb. for irrigation over the last six seasons.

6. The Cotton Marketing Board has a fleet of 16 mechanical cotton pickers. These operate in all recognised cotton districts; 4d. a lb. is charged for picking.

—*W. G. STEELE,*
Senior Adviser in Agriculture.

BECAUSE healthy seedlings are so important to the success of a tobacco crop, effective control of insect pests in the seedbed should be the aim of every tobacco farmer.

Seed harvesting ants are usually deterred by spreading a layer of medium grade river sand on the beds after planting. This layer should be about one-eighth of an inch thick. Leaf harvesting ants that attack the seedlings as they come through can be dealt with by a light spraying of dieldrin or endrin at 0.05 per cent.

Leaf miner, looper, cluster caterpillar and sometimes budworm can cause serious damage to seedlings. Two weeks after germination, or earlier if necessary, commence light weekly sprayings with 0.05 per cent. endrin or dieldrin. Give the seedlings a thorough spraying with endrin or dieldrin a day before transplanting them into the field.

—*G. W. SAUNDERS,*
Entomologist.

Do It In December

CHECK on the height of your early cowpeas and millets. Ten to 12 in. is the right height for better and longer grazing.

Shut stock out of your renovated and fertilized paspalum paddocks. These will be ready then for ensiling in March or April.

Look for ways of improving your dairy cleansing management; this action may lead to improved techniques and better milk and cream grades.

Drench early and free all young stock of worms.

Machinery for Hay and Silage

By Officers of the Agriculture Branch.

WHERE machinery can be used efficiently, it facilitates hay and silage making by reducing manual labour and by increasing the speed of operations.

This is especially so where most of the various operations necessary in making hay or silage are combined in one machine. By combining these operations, the number of operators is reduced. Some of this equipment entails an initial heavy capital outlay. The additional interest and depreciation charges on it may outweigh the saving of labour unless sufficient tonnages of crop are handled.

The choice of equipment must in the final analysis be related to factors such as the amount of work to be done, availability of labour, and storage facilities and their location. Thus, the methods and equipment used will vary from farm to farm.

Labour Costs.

In computing labour costs, the universally used unit of "man-hours per ton" makes it possible to compare the labour requirements of various farming methods, and so determine the total labour involved in any combination of operations.

To illustrate this unit, we will assume that 4 tons of hay are harvested by 6 men in 2 hours. The man-hours involved would be 6 × 2 (= 12) for 4 tons or, simply, 3 man-hours per ton.

Now, if it takes 3 man-hours per ton to harvest and store the crop, 1 man-hour for mowing and ½ man-hour for raking, the total for all three operations would be 4½ man-hours per ton of conserved fodder.

An illustration of how mechanisation reduces the amount of labour used in raking is given in Table 2.

Cost of Operating Machinery.

In estimating machinery costs, depreciation, interest, housing, repairs and servicing, labour, fuel and oil are all items which must be included. Since operational costs will depend on conditions existing on each individual farm, the items of cost quoted can only be used as a general guide to costs and efficiency. The actual costs can then be adjusted to conform with local conditions.

Carting and storing normally present far greater problems than cutting. Usually a crop can be cut more quickly than it can be carted and stored. Consequently, the cutting cost per acre or per ton is relatively low.

Forage harvesters have their own inbuilt cutters, but where crops have to be cut and then collected in other ways, the reciprocating mower is most commonly employed.

1. Mowers.

Mowers are manufactured in six general types:

(1) Horse-drawn ground-drive mowers.

(2) Tractor-drawn ground-drive mowers.

(3) Tractor trailer power mowers.

(4) Semi-mounted power mowers.
(5) Fully-mounted three-point linkage and mid-mounted power tractor mowers.
(6) Mower attachments for walking type horticultural tractors.

Most farmers are familiar with the horse-drawn mower.

The tractor hitch ground-drive mower is more heavily built to operate at faster speeds than the standard horse-drawn type.

Trailer power mowers can be attached to any type of tractor equipped with a power-take-off (P.T.O.). They are not so manoeuvrable as the other types of power mowers.

Semi-mounted power mowers are attached directly to a plate on the drawbar of the tractor and are usually carried on one or more castor wheels. This type of mower can be attached to any make of tractor with a P.T.O. It is readily manoeuvred and can be quickly removed.

Fully-mounted three-point linkage power mowers are very flexible in operation, but some models are not so easily attached to the tractor as the semi-mounted type. As they are rear-mounted, the drawbar of the tractor cannot be used for haulage of other equipment. In order to overcome this disadvantage the centre- or mid-mounted mower is extensively used overseas. It allows other equipment to be hauled or rear-mounted, and in addition the cutter-bar is under the direct view of the tractor driver.

Mowers attachable to walking tractors cut up to 3 ft. in width and the tractors have only a low speed. Consequently, these machines are of limited use in fodder conservation.

Various devices are now incorporated with or can be attached to power mowers. There is the break-away cutter-bar release which safeguards the cutter-bar should an obstruction be met. Hydraulic lift control can be provided for raising the cutter-bar. Some mowers are fitted with cutter-bars that will cut at

Plate 1.

Semi-mounted P.T.O.-operated Mower Modified for Three-point Linkage.

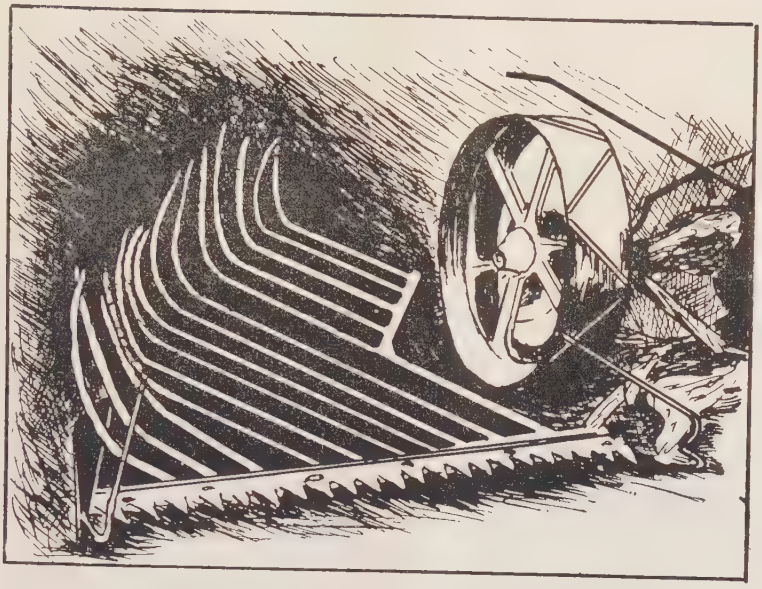


Plate 2.
Windrow Attachment.

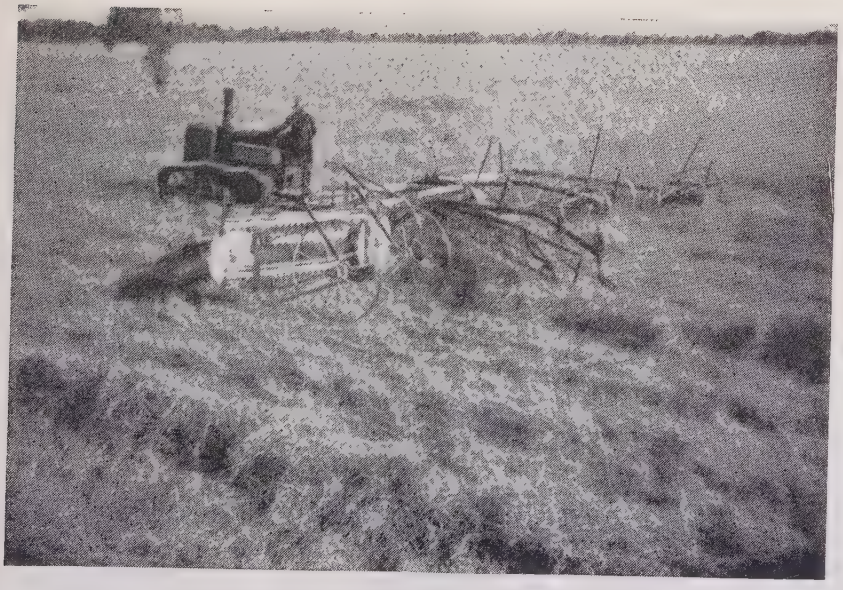


Plate 3.
Mowing and Raking Bush Hay at Colwell Station, McKinlay.

various angles to the horizontal. Such units are particularly useful for cutting along road banks, ditches or terraces.

Curved divider rods are useful attachments when fitted on the front of the outside shoe to guide the crop and thus permit the knife to make a cleaner cut. The divider board can then separate the swath from the standing crop. A divider rod is especially useful when cutting lodged and tangled hay crops.

Windrow attachments (Plate 2) consisting of a series of parallel metal straps fastened to the cutter-bar enable the crop to be windrowed at cutting. These attachments operate satisfactorily on tractor mowers, provided a speed of 3 m.p.h. is not exceeded. At higher speeds there is a tendency for the cut material to lodge on the attachments. They also have a tendency to hinder operations when cornering or backing. Windrow attachments are useful when cutting for silage or when cutting in light crops for hay.

Where large areas are operated, two or more mowers and a side-delivery rake may be ganged together. (Plates 3 and 4).

This need to cover large areas quickly has led to the development overseas of machines known as "windrowers" which are equipped with cutter-bars of 10-15 ft. and incorporate a windrowing device. The smaller models can be operated off the tractor P.T.O., whereas the larger models are usually self-propelled, engine-

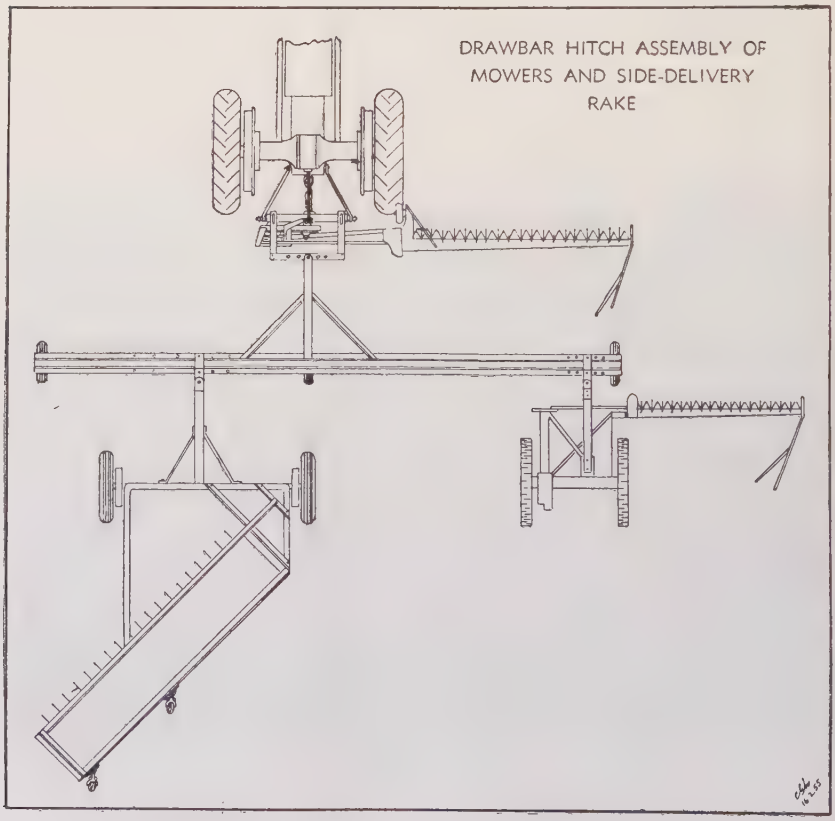


Plate 4.

Plan Showing the Hitch Assembly for Drawbar, Mower, and Side-delivery Rake.

TABLE 1.

CUTTING HAY WITH MOWERS.

Machine or Method.	Crew Size.	Acres per Hour.		Man-Hours per Short Ton.
		Range.	Average.	
Tractor Power Mower 5 feet	1	..	1·7	0·39
Tractor Power Mower 6–7 feet ..	1	1·5–3·5	2·0	0·33
Horse Mower 5–7 feet	1	0·7–1·2	0·9	0·74

Source: Central Experiment Farm, Ottawa.

functioned units. Windrowers should be particularly useful for bush hay conservation. As they are not designed for operation under rough conditions, their use at present is confined to cultivated land or to level pasture country free from obstructions.

Power mowers have the advantage that knife speed and forward speed are, to a certain extent, independently variable by choice of gear. This is an advantage, both when dealing with heavy crops which require a low forward speed and when topping pastures at high speeds.

Proper maintenance of equipment has a direct bearing on the number of acres that can be mown in a day.

The accompanying hay-cutting table (Table 1), compiled as a result of tests carried out in Canada with various types and sizes of mowers, can be used as a guide to Australian conditions. In all cases the assumed yield was 1½ short tons per acre. (A short ton is 2,000 lb.).

2. Rotary Grass Cutters.

The rotary grass cutter is usually employed where it is not desired to collect the grass, such as in orchards or in pastures which are being

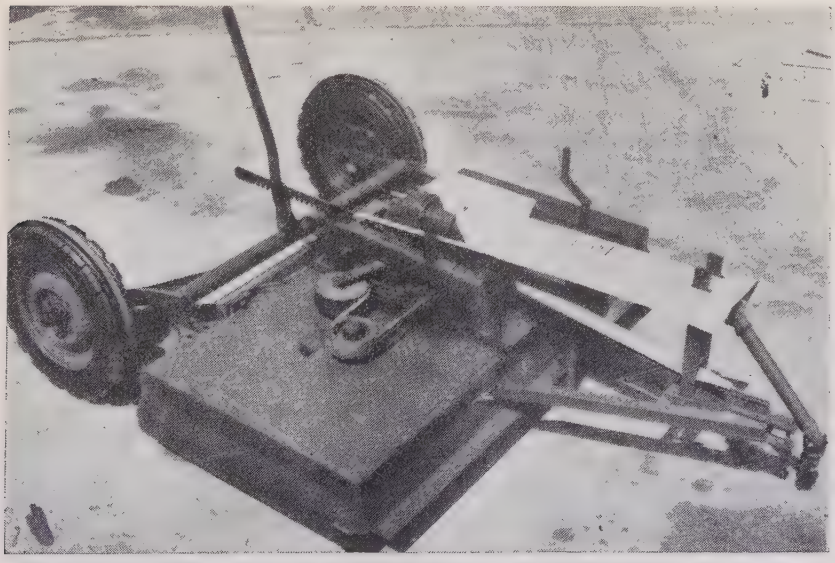


Plate 5.

Rotary Grass Cutter, P.T.O.-operated, with One Belt Shield Removed to Show Multiple V-belt Drive. This machine is also used as a brush cutter.

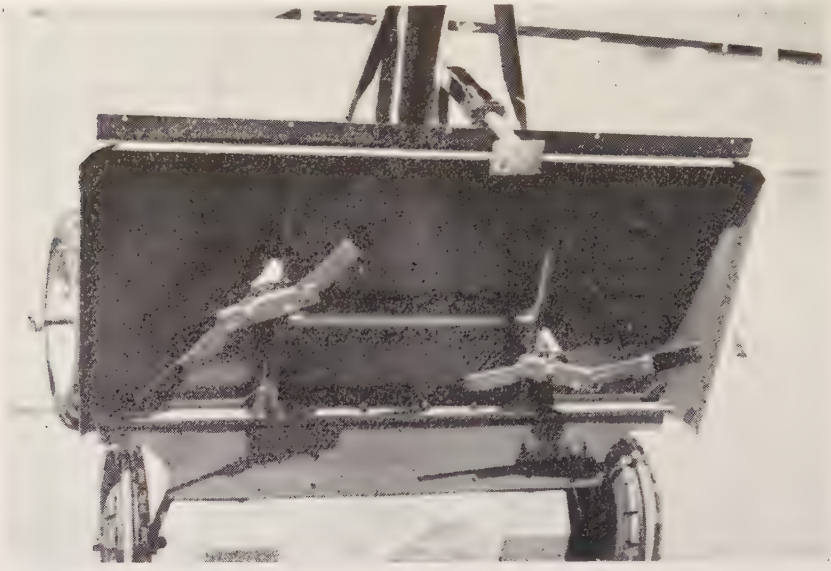


Plate 6.

Rotary Grass Cutter Raised to Show Replaceable Knives Under Shield.

grazed. The principle is being incorporated in some types of forage harvesters. Grass cutters of this type employ high-speed, horizontally-rotating knives. The design of the blade carrier varies. It may be a square steel plate or a circular disc to which are attached renewable mower knife sections or short reversible swinging bar blades, or it may have

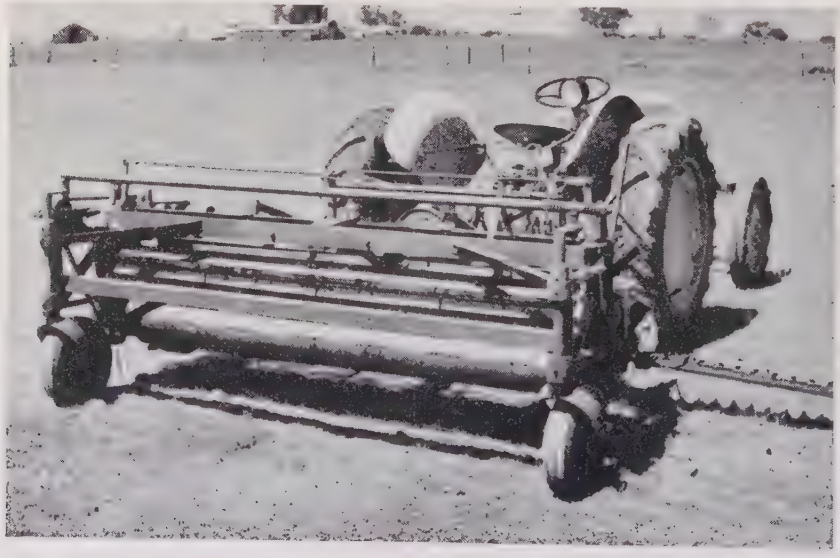


Plate 7.

Combination Mower and Hay Conditioner made at Glenore Grove, Lockyer Valley.

two or more long, heavy-duty high-tensile steel blades heat treated for cutting grass, scrub, etc. These plates, discs or heavy-duty blades are driven by V-belts and gearing from the tractor P.T.O. A shield usually covers the rotors to provide protection from flying stones, etc.

3. Roller-Crusher or Hay Conditioner.

A roller-crusher is a machine equipped with two heavy steel rollers 5 ft. or more in length that partially crush the cut material as it passes between them when picked up from the swath. Treatment of the plant in this way cracks the stems and accelerates the curing process. Under tests in good drying weather, it has been found that curing time can be reduced by as much as 50 per cent. In poor drying weather, however, reduction in curing time has been negligible, amounting to approximately 10 per cent.

Under quick-drying conditions the crop should be bruised shortly after mowing. More rapid stem drying is achieved, and hay of improved quality can be made.

Rather high capital and running costs are involved in carrying out the bruising process, and little is yet known of the economics of the operation.

4. Rakes.

In haymaking, an average loss of 25 per cent. or more of the dry matter contained in the fresh material usually occurs through leaching, fermentation and mechanical losses in handling. The mechanical loss is mainly of the more digestible leaf portions, especially in the case of lucerne and other legumes. Therefore, the actual loss in feeding value is greater, ranging from 30 per cent. to 50 per cent., according to conditions.

Plate 8.

The Horse-drawn Dump Rake in Action, Raking Lucerne.

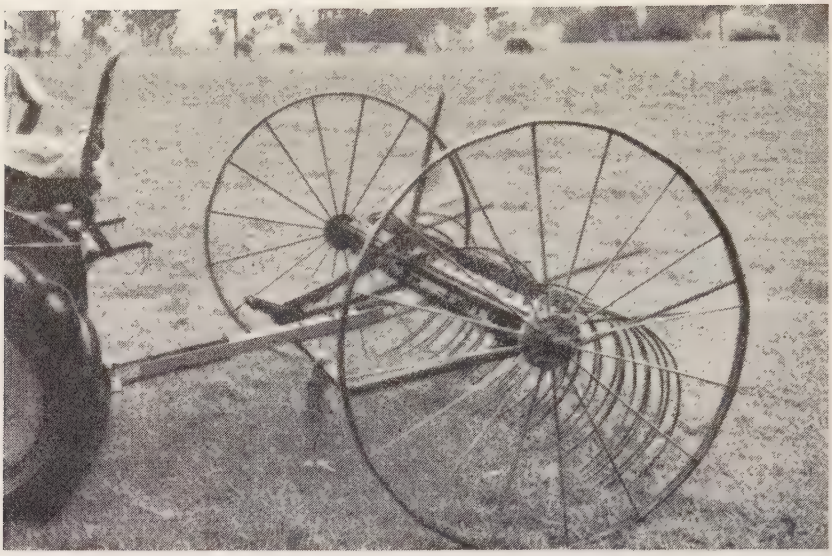


Plate 9.
A Dump Rake Modified for Tractor Operation.

After a hay crop is cut, therefore, it is desirable to wilt, cure and dry it as rapidly as possible to a point where it is suitable for storage. The equipment and methods employed during harvesting operations will naturally vary considerably.

The dump rake and the side-delivery rake are both commonly used in haymaking operations.

Dump Rakes.

Horse-drawn or tractor-drawn dump rakes, 10-14 ft. wide, are relatively low in initial costs, and are therefore suitable for small farms. They can also be used for raking rather rough pasture land.

Wide tractor rakes, with self-lifts, have been introduced for speeding up haymaking operations. For easy transport and handling through narrow gateways, these rakes are constructed with telescopic axles, or with wheels which can easily be removed and fitted to auxiliary axles, allowing the rake to be towed end-on.

Light tractor-mounted rakes, with a separately articulated dumping mechanism operated by the tractor's hydraulic system, are also marketed overseas.

Side-delivery Rakes.

Side-delivery rakes are used to windrow material from the swath. They are generally used in conjunction with hay loaders, pick-up balers and forage harvesters. They make looser windrows than the dump rakes and quicker drying of the hay occurs. These rakes are made in the following three types:

(1) Cylinder.
(2) Roller Bar.
(3) Wheel.

The cylinder type is the conventional side-delivery rake with the cylinder being ground-driven or driven off the tractor P.T.O. (Plate 10).

The roller bar or rake-bar type (Plates 11 and 12) is a combined side-delivery rake and swath turner.

Plate 10.

A Ground-drive Cylinder Type Side-delivery Rake.

Plate 11.

P.T.O. operated, Three-point Linkage, Roller Bar Type Side-delivery Rake.

This type is similar to the conventional side-delivery rake, but the spiders that carry the tooth bar are set at right angles to the direction of machine travel. The rake usually handles two swaths and can therefore rake five swaths together in one return trip across the field. A common type of machine overseas is one which can be used as a side-delivery rake, a swath turner and a tedder. When the machine is used as a swath turner the teeth in the centres of the rake bars are removed.

When raking a 7 ft. windrow, the roller bar type of machine moves the hay about 10 ft., whereas the ordinary cylinder type moves it about 18-20 ft. If the hay is in reasonably good condition, and the speed of operation is moderate, roller-bar hay rakes should reduce leaf loss.

Wheel rakes have a number of independently mounted, large-diameter wheels with spring teeth arranged radially (Plate 13). The wheels are set obliquely in the frame and are driven by contact with the ground. These machines are designed to operate at fairly high speeds (4-5 m.p.h.). Due to their free-floating action, they are suitable for use on uneven land.

Like the roller bar rake, the wheel rake moves the hay a shorter distance and more gently than the conventional side-delivery rake. Thus leaf loss is reduced. By removing the centre wheels the machine can be used as a swath turner.

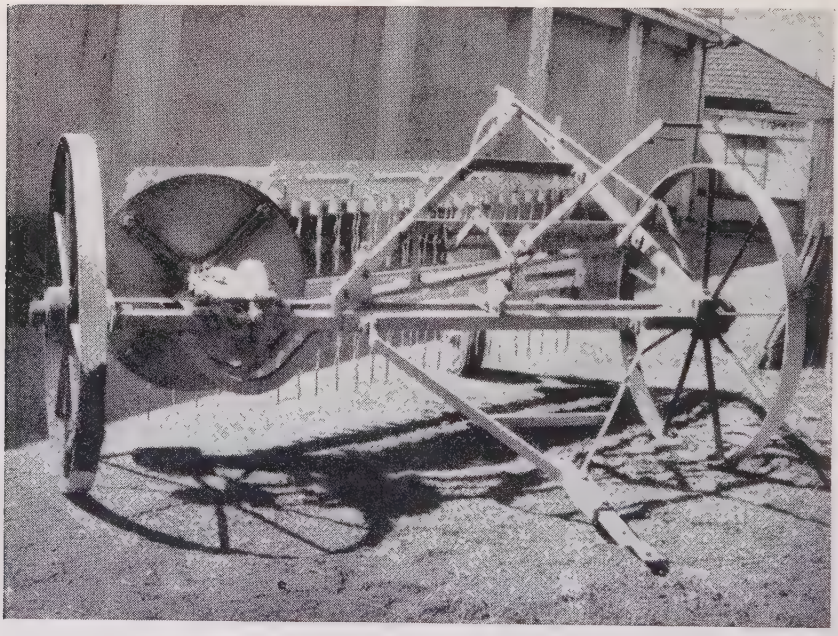


Plate 12.

A Ground-drive Roller Bar Type Side-delivery Rake.

TABLE 2.

RAKING.

RATE OF OPERATION AND MAN HOURS PER TON.

Method or Equipment.	Crew Size.	Rate per Hour for Crew in Acres.		Man-Hours per Short Ton.
		Range.	Average.	
Tractor and Tractor Side-Delivery Rake 5–7 feet	1	1·5–4·0	2·5	0·27
Horses and Side-Delivery Rake 5–7 feet	1	1·2–2·4	1·6	0·42
Tractor and Tractor Dump Rake 10–12 feet	1	2·0–4·0	2·5	0·27
Tractor and Tractor Dump Rake 21 feet	1	5·0–9·0	7·0	0·10
Horses and Dump Rake 10–12 feet ..	1	1·4–2·4	1·8	0·37
Hand Turning Hay	1	0·3–1·0	0·4	1·67

Source: Central Experiment Farm, Ottawa.

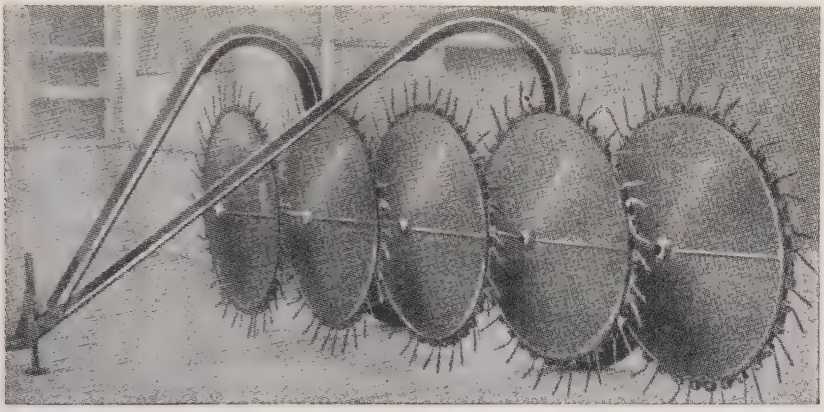


Plate 13.
A Ground-driven Side-delivery Wheel Rake.

[TO BE CONTINUED.]

This Actually Happened

A dairy farmer was caught by the coat in a milking machine engine and thrown heavily to a concrete floor. He was taken to hospital with a broken thigh and multiple abrasions.

Many accidents are caused by loose and unsuitable clothing and unprotected shaft ends.

Treat Your Cotton Seed

By MELDA L. MOFFETT,
Assistant Pathologist.

TREATMENT of cotton seed with a fungicidal dust before planting can mean an increased stand. Seed borne diseases such as angular leaf spot are also prevented.

Failure to obtain a good stand in a cotton planting may be due to weather conditions or faulty cultural practices. In many cases, however, it is due to micro-organisms which may rot the seed or attack the young, developing plants before or soon after they reach ground level. These parasitic fungi or bacteria may be present on the fuzz or seed coat when the seed is planted, or be harbouring in the soil. Seed treatment not only kills most of the organisms present on the seed but also places a narrow chemical barrier round the seed in the soil. This barrier prevents the attack of soil organisms while the seed is germinating.

Angular leaf spot is probably the most serious disease of cotton in Queensland. It is seed borne and many outbreaks can originate in this way. The bacteria causing this disease develop on the plants grown from infected seed, and spread through the crop during rain or irrigation. The stems, branches and bolls are attacked as well as the leaves. Residue from previous, infected crops can also harbour the bacteria so that seed treatment is not the complete answer to the problem. It will, however, eliminate an important source of the disease.

What to Use.

Removing the fuzz from the seed with sulphuric acid (acid delinting) will kill any organisms on the seed. Because of the difficulties involved, this treatment is rarely carried out by cotton growers but details can be obtained on application to the Department of Agriculture and Stock.

Dusting of the seed with an organic mercurial fungicide is also effective and because of its simplicity is usually preferred. Several brands of these mercurial dusts are on the market and a good coverage of the seed is essential. Seed supplied by the Cotton Marketing Board at Rockhampton is already treated, but growers purchasing seed from other sources should dust it by agitating the seed with the dust in a barrel or drum. The dust is used at the rate of 4 oz. to 30 lb. of seed with fuzzy seed or 2 to 3 oz. to 30 lb. of mechanically delinted seed.

Warning.

Mercury treatments are poisonous, and care should be taken to avoid excessive handling or inhaling of the dust.

Dairy Parade

SINCE the introduction of group herd recording into Queensland, figures have proved that it definitely pays to practice seasonal calving. By seasonal calving is meant the practice of managing the herd to ensure that all or most of the cows calve in a limited time. This period should be the one from which you will get the highest production. Herd recording figures show that for every district there is a period in which it is best to calve cows. Cows calved in this period will yield more than those calving at any other time. In the year 1956-57 cows which calved in the third quarter of the year produced 25 lb. butter fat more than those in the first quarter. This would mean an increased income of £5 10s. per cow each year.

Now, to practise seasonal calving successfully you must have some means of controlling your herd sire. This will mean locking him up in a bull paddock. To build a bull paddock is relatively simple but the provision of shade and shelter is a different matter. In some districts, particularly on parts of the Darling Downs where trees are scarce, it is very difficult to provide this shelter and so you have to provide a shed for the purpose. Bulls have a reputation of being hard on sheds; therefore some care is necessary in selecting the best type. You must have a shed that is pretty substantial.

The Crawford brothers, of R. J. Crawford & Sons Jersey Stud near Kingaroy, have overcome this problem by building a shelter for their bulls out of concrete. This shed which is circular in shape is located at the extreme end of the paddock. It is placed and constructed so that there is no need to go into the paddock to feed or catch the bull. They have placed a window in the back of the building through which they can feed the animal and also catch him if required. Being round, there are no dangerous corners in which a man may be trapped if for some reason or other he has to enter the pen with the bull. There is no door on the shed. This eliminates the danger of anyone being shut in with the bull by the door closing behind him. The feed trough is also made of concrete and is so constructed that the bull can't get his head under it and break it up as bulls will with wooden feed troughs.

The shed is 13 ft. in diameter and 7 ft. high. The Crawford brothers first of all put down a fairly substantial foundation of rocks bound together with concrete. To build the walls they then used a mould which they had on the property and had previously used for building silos. Suitable frames were fitted into the moulds to form the openings for the doorway and window. To form the necessary slope for the roof the Crawfords used bricks graded up from back to front on top of the cement. The rafters to hold the iron were embedded in these bricks.

The result was a shed that is there to stay. It is a shed that will provide adequate shelter for the bull and keep him warm in winter and cool in summer. The total cost was in the vicinity of £40.

—J. SMITH,
Dairy Adviser.

ELECTRIC water heaters for the dairy have come to stay. More and more farmers are finding them a convenient way of obtaining their hot water for washing up. Your first care should be to get a heater big enough for the job. For a two or three unit plant, you'll need a 17-gallon boiler to deliver 14 gallons, and for bigger machines at least a 22-gallon system to deliver 18 gallons.

In electric boilers, the tube which encloses the element often becomes encrusted with boiler scale from hard water. This causes the element to become overheated and burn out. You can prevent this by emptying the boiler and scraping off the scale when necessary. Rainwater is the safest water to use in boilers. If the water supply is very hard, it may pay to put up tanks to collect rain water.

—*J. D. ELRINGTON,*
Senior Dairy Machinery Adviser.

MOST dairymen should know that washing the udder not only cleans it but also stimulates it, and a stimulating milking routine gives an increased milk yield.

Good udder stimulation could mean for some farmers an increase of £100 a year. Recent studies have shown this at Ruakura Animal Research Station, New Zealand.

Identical twin cows were used in the trials, and well stimulated animals showed an average increase in yield of 16 per cent. On the other hand some cows did not respond at all.

Dr. Whittlestone, formerly of Ruakura, and now of the University of Sydney, says that the best way to stimulate a cow is to rub her udder and teats with the bare hands using a hose and running water to moisten the surface and wash away dirt. At least 30 seconds of vigorous rubbing is necessary to get good stimulation, and if a hose and running water are also used, the udder can be made surprisingly clean. Finally the udder should be rubbed with a cloth squeezed out from a chlorine or similar solution. This will kill bacteria left on the udder. Just before putting on the teat cups a squirt should be taken from each teat into a strip cup. This will check for mastitis, stimulate the cow, and remove the first teat-full of milk, which tends to contain a large number of bacteria.

So if you have the water, and a good floor in the bails, the best way to wash the udder is to use the bare hands and running water for 30 seconds and then rub the udder with a cloth wrung out from a chlorine solution.

—*J. CALEY,*
Dairy Technologist.

Straight Talking on Strain 19

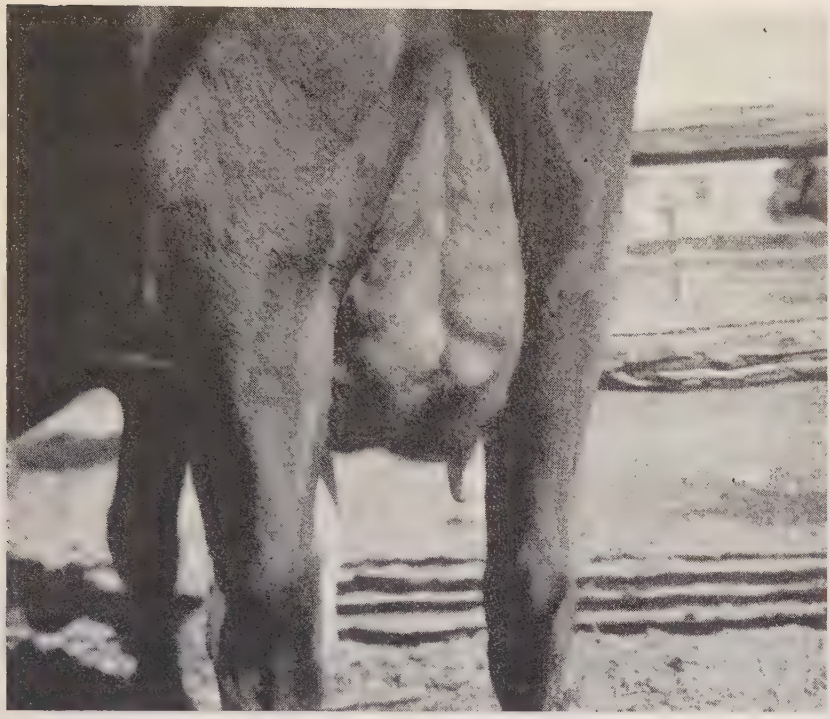
The wise farmer knows that, even though Strain 19 will not prevent *all* cases of abortion in his cows, it is still well worth using. This is straight thinking, based on the following facts:—

(1) Abortion can be caused by—
Brucellosis
Vibriosis
Leptospirosis

(2) Strain 19 is effective in preventing brucellosis, but is not effective against vibriosis and leptospirosis.

(3) As brucellosis *causes most* abortions in cattle, Strain 19 will *prevent most* of these abortions.

Therefore, Strain 19 should be used on all heifer calves.



Hopeless Chronic Mastitis!

IN THE udder of this cow you can actually see the hard lumps in the tissue that the mastitis infection has caused. Treatment of this case is hopeless. A cow like this sheds germs in the milk and is a menace to the rest of the herd.

It is exceptional to be able to see the results of chronic inflammation. Generally, skilled feeling of the udder is necessary to detect them.

Mastitis is difficult to deal with. Treatment alone is not the answer, even when the most powerful drug is used. It's absolutely essential to plan your attack on mastitis on all fronts.

Your veterinary surgeon's knowledge and experience can help you in this.

—*W. R. RAMSAY,*
Veterinary Officer.

Tuberculosis-Free Cattle Herds. (As at 21st October, 1958.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
W. E. O. Meir and Son, "Kingsford" Stud, Alberton, *via* Yatala
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
W. S. Kirby, Tinana, Maryborough
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Harness the Wind

By W. R. SIGLEY, Dairy Officer, Allora.

A mechanically-minded dairy farmer on the Darling Downs has constructed a useful and cheap wind-charger for his electric fence.

Early in 1957 Mr. Norman Fiechtner, of Hurstvale, Ascot, decided to improve his method of pasture and crop usage. The best way was by controlled grazing, using an electric fence. On noting the costs, Mr. Fiechtner reasoned that he would be able to use natural conditions to generate the necessary electric current for the fence.

Built on the same lines as a windmill, his electric fence unit works as follows: Air currents revolve the

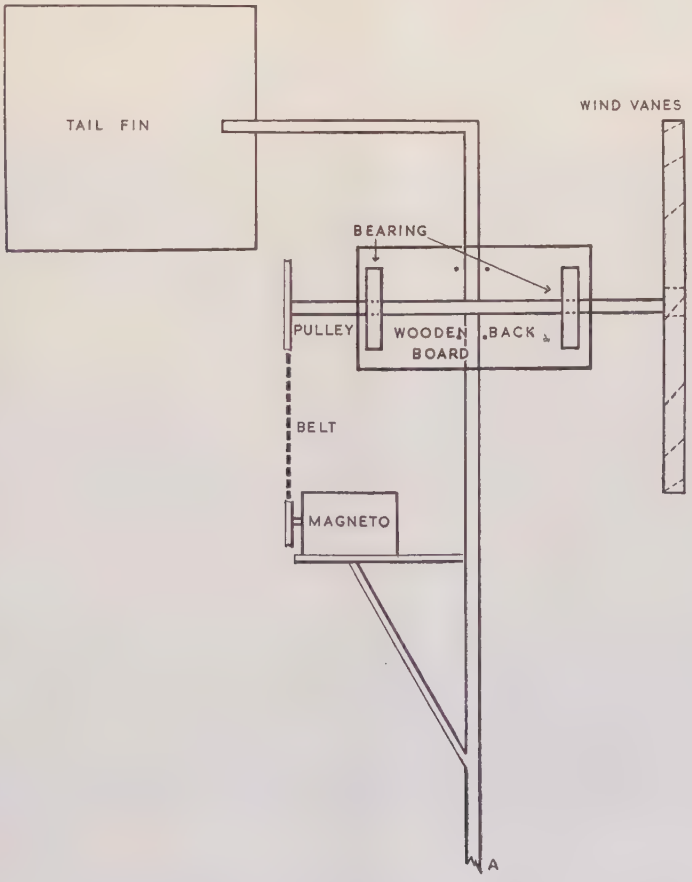


Plate 1.

Plan Showing Shaft Bearings and Magneto for Windmill Generator.

wind catcher, which in turn revolves the connecting shaft. A driving pulley on the shaft end turns, and the necessary magneto to generate an electric current is driven indirectly by means of a belt. (A second method of driving the magneto would be to couple it directly to a propeller. This is safer, cheaper, and equally as effective as the wind wheel for wind velocities of approximately 10 m.p.h. A propeller would be rotated by a wind velocity lower than 10 m.p.h. but it is doubtful whether a wind wheel would function satisfactorily under such conditions.)

An insulated wire joins the magneto to the fence to be electrified. (An added safeguard to protect the wiring from weathering would be to run the wiring through conduit clamped to the mast.)

Only a mild breeze is necessary to generate current for the electric fence. Mr. Fiechtner reports that it is seldom that the connected fence is not "alive". Even then, the cows treat it as though it were "alive.' The wind-driven electric fence unit has never been out of use and it has stood up to gale force winds. A brake is fitted and can be used if necessary.

[*NOTE: This wind-charger won a prize in the farm gadget competition at the recent Toowoomba Farmers' Festival.*]

Don't Let It Run Away

Water that cannot be absorbed by the soil should be held for stock or irrigation.

Getting Rid of Brigalow

"O.G.", of Nebo, asks: Could you please supply the latest information on aerial spraying of brigalow, including cost per acre, and contract companies in central and northern Queensland who do this work? I would also appreciate the cost of mechanical clearing as practised in the south west, for comparison with aerial spraying costs.

Answer: Aerial spraying of tall brigalow has proved quite successful. In all areas seen by officers of the Botany section, kills of over 80 per cent. have been obtained. However, in scrubs with much understorey brigalow results have not been so good. The emergent tall trees are killed but much of the undergrowth brigalow often escapes serious damage, apparently as a result of protection by the larger trees.

Sucker brigalow and dense understorey brigalow—particularly where the suckers are branched low—are difficult to control. Kills as low as 5 per cent. have been common in some seasons and it is rare to kill 70 per cent. of the suckers.

At present we cannot recommend aerial spraying of this type of brigalow. Best results have been obtained when the plants were growing vigorously, mostly in warm weather after rain had fallen.

Operators who are engaged in aerial spraying of brigalow in Queensland are: Agricultural Aviation Pty. Limited, Beatty Road, Archerfield; Air Spray Corporation, Beatty Road, Archerfield; J. & A. Bjelke-Petersen, Box 141, Kingaroy; Hardy Bros., Agnew Street, Norman Park; W. P. Kemp, 56 Outlook Crescent, Bardon; Queensland Air Planters Limited, Childers; Super Spread, 110 Mary Street, Toowoomba.

The cost of spraying varies according to the type of brigalow, the area to be treated and the ground facilities available. If the area is virgin scrub with little understorey, ½ to ⅔ lb. of 2,4,5-T in oil per acre is used and the total cost for hormones, oil and flying is £1 10s. to £2 per acre.

In recent years much brigalow in southern Queensland has been cleared by pulling. Operators work on an hourly basis and costs vary between £22 and £25 per hour. The cost per acre varies according to the type of brigalow to be pulled and the soil moisture conditions and ranges from £1 10s. to £4 per acre.* The pulled over material makes a tangled mass of logs and branches on the ground and in order to manage animals or to work implements this debris must be burnt. Burning is sometimes done within a few weeks of pulling, sometimes months later. Following the burn suckers often appear. Unless they are kept under control they grow rapidly and the area is likely to revert to brigalow denser than the original stand.

In many areas sheep are used to control suckers as they appear. Sheep will eat brigalow for only a short time after the new suckers appear so that there must be sufficient animals to force them to eat the suckers. Sheep "sucker bashing" generally lose condition and have to be replaced at intervals.

Ploughing with a heavy disc plough such as a Majestic is also used. Following the initial ploughing it is usually necessary to keep the land under cultivation for a few years in order to kill new suckers as they appear.

* A cost as low as 15s. an acre has been reported.

Spraying from the air or with ground equipment also shows great promise for the control of very young suckers. In one experiment, spraying of new suckers eight weeks after they appeared following a burn gave excellent results. Further tests are to be carried out with this technique.

In many districts it is customary to sow Rhodes grass directly on to the ashes of the burn. The grass helps to keep sucker growth in check but a dense grass cover must be maintained. Breaking the pasture through overstocking, clean burning or drought can result in rapid development of suckers.

If the area is virgin scrub which is to be converted to grazing land, aerial spraying would be the most suitable method to use. If the area is undergrowth or sucker brigalow or is to be put under cultivation it would probably be better to use machinery. With aerial spraying it is advisable to leave the area undisturbed for 3–4 years after spraying.

Manual Methods.

"B.P.", of Chinchilla, asks: Would you be kind enough to let me have the latest information to hand in clearing the following. (We are limited to manual methods.):—

(1) Brigalow in all stages from small regrowth to fully developed stands.

(2) Bull oak regrowth.

Answer: 1. *Brigalow.*—If you are limited to manual work, three methods are available—(*a*) ringbarking, (*b*) chopping, (*c*) spraying.

On brigalow with clean, unbranched trunks it would be best to ringbark, cutting through the bark completely but not too deeply into the sapwood and taking great care to meet the cuts so that the tree is completely encircled. This may be done at any time. The area must not be burnt within four or five years after ringbarking otherwise dense suckering is likely to take place from the roots.

Small sucker brigalow and larger bushes branched low are difficult to kill by any method. Occasionally good kills can be obtained by cutting the stems high (about 4 ft. above ground) particularly after a wet season whilst the ground is still wet. Spraying with 2,4,5–T also gives variable results but persistent spraying will eventually kill most of the plants. Use 2,4,5–T mixed with water at a strength of 0.1 per cent. and spray the leaves and branches until they are just wet. The Secretary, Land Administration Board, Department of Public Lands, Brisbane, can supply 2,4,5–T at cost price. This particular brand should be mixed at 1:400. Another alternative is to cut the plants near the ground and brush, swab or spray the cut butts with 2,4,5–T at a strength of 1 per cent., that is 10 times the strength used for spraying the leaves.

2. *Bull Oak.*—The bull oak of your district is not susceptible to 2,4,5–T and we do not know any other non-poisonous chemical which will kill it. Bigger trees should be ringbarked in the same way as described for brigalow. Regrowth suckers or seedlings can be sprayed with arsenic pentoxide or other arsenical weedkiller, but these chemicals are poisonous to stock and are not safe to use in grazed paddocks.

—*S. L. Everist, Government Botanist.*

Stock Gazette

THE number of healthy pigs you rear from each litter has a big bearing on your cost of production. When feed costs are high, there's only a small profit in each porker or baconer you market.

It's during these periods of high costs that prolific sows mean the difference between profit and loss.

Feeding and managing a breeding sow calls for a great deal of time and expense each year. If your sows rear small litters, each weaner is expensive in terms of precious time and feed. Economic use of expensive housing also favours the sow with a large litter.

Breeding records will quickly show you which sows are prolific and likely to cut down production costs. Replace poor breeders with sows that will give you the healthy, heavy, low-cost weaners so necessary for profitable production.

—*F. BOSTOCK,*
Senior Pig Husbandry Officer.

PROBLEMS of ill health occasionally crop up in stud rams that spend a good deal of time under shedded conditions. Taken at random, some of the disorders are:

(1) A form of mange, and a subsequent rather unusual form of fly strike.

(2) Urinary calculi.

(3) Bighead from photosensitisation.

(4) Odd instances of a condition suggestive of rickets.

The type of mange in stud rams which is referred to is caused by a minute mite called *Chorioptes.* This mite tends to infest the skin of the scrota or purses of rams. It was first observed to infest sheep by H. McL. Gordon in 1942. Its geographical incidence amongst Queensland sheep is not well defined. It causes irritation so that rams stamp and kick and may lose condition. Samples of skin scrapings for identification of this parasite are best taken by officers trained in such techniques. Examination of the purses of affected rams shows parts of the skin to be wrinkled, ridgy and leathery. As the infestation proceeds, there is a brown, scabby formation. Spraying the feet and purses of affected rams with 0.1 per cent. BHC will do much to control the trouble. Rams affected with chorioptic mange tend to kick at the scrotum, and this habit gives rise to another disorder. In kicking they carry to the affected parts straw litter and dirt that has been fouled by urine and excreta. This attracts blowflies which strike the fouled parts, so that you sometimes find flystrike of the scrotum concurrent with mange. BHC used in the treatment of the mange will probably clear up the fly trouble also. Husbandry to prevent mange infestation and possible concurrent fly strike calls for frequent changing of straw litter and hosing of gratings and floors of ram sheds. Spraying of shed interiors with 1 per cent. DDT will check blowfly trouble and also keep the small black fly in check, contributing to the contentment of housed rams.

Cases of urinary calculi are not uncommon in housed rams, which mostly derive their ration from hand feeding. If this is mainly grain concentrates, these are deficient in calcium, commonly called lime; 1 per cent. of fine ground limestone with all grain rations will help to lessen incidence of urinary calculi. In advanced stages of calculi the condition is inoperable, and treatment seldom of use.

Cases of bighead from photosensitisation in stud rams are found to occur now and again when rams are partly shedded and partly paddocked, and following recent access to lush herbage.

Re-shedding of the affected animals, that is, removing them from the sunlight, is the best treatment. Bighead from photosensitisation is similar in appearance to bighead from another cause, organisms causing blood infections. Because of these resemblances and possible confusion, it is well to call an expert for correct diagnosis and treatment.

Rickets should be unusual or very rare in sunny Queensland, since animals utilise sunlight for the formation of anti-rachitic vitamin D in their bodies. However, rams shedded for very long periods in dark and gloomy sheds could develop rickets. The condition would probably show up as lameness or bent leg bones in young rams. Besides vitamin D the sheep also need calcium and phosphorus to prevent rickets. In animals kept out of sunlight the amount of both calcium and phosphorus and the ratio of calcium to phosphorus are both important. Therefore the sheep ration must be balanced for calcium and phosphorus. If you suspect vitamin D deficiency in your rams, particularly those subject to long housing, you can do one of two things. Let them go out in the bright sunlight for a period daily or drench them with a vitamin D concentrate.

The Sheep and Wool Branch would welcome reports made through its Advisers of the presence of chorioptic mange trouble in rams so that its geographical range may be more fully determined.

—R. B. YOUNG,
Senior Adviser in Sheep and Wool.

Timely Tips For December

December's hot weather will increase the risk of infectious diseases in your pigs. Make sure you have your veterinary surgeon investigate any unusual symptoms in pigs. Early treatment is best. Sick pigs can still be profitable if treated in time.

Have any dead pigs examined by a veterinary surgeon too. If you know what killed them, you may be able to save others.

Vaccinate for blackleg in areas where the disease has cropped up in the past, if you haven't done so already.

Ticks breed quickly this month. Tick burdens definitely lower production. Keep close watch on tick numbers and treat promptly.

Be as clean as possible when castrating pigs. After the operation put them in a clean pen to avoid wound infections.

Good summer feed produces a flush of milk. If this is passed on to calves suddenly, nutritional scours may result. Give them time to adjust by increasing gradually the amount of milk fed.

Don't Forget the Disc Harrow.

The disc harrow is one farm implement that should always receive regular attention, yet it's surprising just how often this machine is overlooked. You can't make the best use of tractor fuel unless your machine is in good order.

Mr. C. G. Wragge, Agricultural Engineer, says it's important to check the bearings for wear and to replace any that are badly worn. See that the bearings are always well lubricated, as they need plenty of grease.

Check the main arbor bolt that holds the discs and bobbins together. Looseness here will allow the discs to wobble when they're working and in time this will cut through the bolt itself. Adjust the disc scrapers so that the individual scrapers are just clear of the discs. Finally, adjust the discs so that they're level and the rear discs track correctly behind the front ones.

Vaccinate For Blackleg In Early Summer

By W. R. RAMSAY,
Veterinary Officer.

- Blackleg strikes suddenly and runs a swift, fatal course among cattle, sheep and goats.
- Vaccination is a cheap and effective insurance against it.
- The time to vaccinate is in the early summer when animals are entering the susceptible age group.

Blackleg has been known under various names for at least a century. It affects ruminants throughout the world, and is characterised by profound and rapid changes in some of the muscles, almost invariably ending in death.

Cattle between the ages of six months and two years are most commonly affected, although animals both younger and older can be attacked. Blackleg occurs in most cattle-raising districts but is generally localised to certain areas. Most cases occur during the warmer part of the year.

Cause.

The organism responsible, *Clostridum chauveoi,* belongs to a group of germs which grow in the absence of oxygen. It produces spores which allow it to survive in a latent state for long periods under adverse conditions.

As well as causing blackleg, *Cl. chauveoi* is capable of living harmlessly in the bowels of animals and in the soil. Thus once a locality is infested, the organism can survive for many years. The organism enters the animal with contaminated food and invades the body, finally reaching the muscles where it produces the changes characteristic of the disease. How all this happens is not well understood.

Generally speaking, males are more susceptible than females, and animals in good condition appear to be affected more readily than those that are poor.

Symptoms and Lesions.

The changes in the body (lesions) are mainly confined to the muscle mass affected. The common sites are muscles of the shoulder and buttocks. The neck and throat muscles, tongue, diaphragm, muscles of the back and abdominal wall, as well as other sites, are affected at times.

When cut, the affected muscle appears dark red to black and the muscle fibres are disrupted by gas formation. On opening, the gas smells rancid and offensive. The surrounding area also contains gas and reddish yellow liquid. The lymph glands, which the affected area drains, are grossly swollen and blood-stained. The body cavities may contain blood-stained fluid.

These changes in the body may sometimes be confused by decomposition which takes place after death, so final diagnosis rests on the isolation of the causal organism from bacteriological specimens.

The disease is so rapid and death so swift that symptoms are rarely seen. Should an animal be seen before death,

it would show dullness, rapid respiration, elevated temperature and swelling in the affected muscle. Gas in that area could be detected by running the hand over it and feeling the characteristic crackle under the skin.

Vaccination.

Once early scientific workers established the cause of blackleg, immediate attempts were made to produce preventatives. These at first were crude and doubtful. Tapes, wires and other foreign bodies soaked in irritants such as turpentine, or cultures of the organism were threaded through the brisket or the tail. Today, reliable vaccines are available; a small dose by injection gives reliable immunity.

The time to vaccinate is in the early summer when animals are entering the susceptible age group. In bad areas, a second injection 2-4 weeks after the first gives an even stronger immunity. Animals vaccinated younger than six months may need a second injection the following year.

Your veterinary surgeon or stock inspector can advise you further about blackleg. His local experience can help you.

A few shillings may save you pounds

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Milk Fever and Pregnancy Toxaemia in Sheep

By K. E. WELLS, Assistant Husbandry Officer, Sheep and Wool Branch.

Can anything be done to prevent milk fever and pregnancy toxaemia?

If either occurs in a flock, what immediate action should be taken?

The answers to such questions are based on present knowledge of these diseases, and will suggest husbandry practices which could save more ewes and lambs next lambing season.

Milk Fever.

What has gone wrong?—The amount of calcium in the blood is fairly constant in a healthy animal. An appreciable lowering of the calcium content of the blood occurs in milk fever. This is why milk fever is more aptly called hypocalcaemia. In some cases there is an upset in the level of other blood constituents as well, notably inorganic phosphate and magnesium.

Experience has shown that milk fever may occur under various conditions of stress which include—

Fasting—During confinement to yards for shearing, crutching, jetting; during long road or rail journeys.

Change of diet—A sudden change to lush grass after rain; sheep turned on to lush grass after long road or rail journeys; sheep suddenly introduced on to young cereal crops such as oats.

Hungry sheep eating mainly oxalate-bearing plants—Oxalates have the effect of reducing the amount of calcium available for use in the body. Three common plants with high oxalate contents are pigweed, soda bush, and soft roly-poly.

Cold, wet weather—Sheep turned out into bleak weather straight after shearing frequently go down with milk fever.

A diet low in calcium—Sheep fed mainly cereal products or cereal grains for any length of time, such as during drought feeding, are likely to have low levels of blood calcium. Milk fever may not, however, occur until sheep are driven, or some other stress factor operates.

Exercise—It is often noticed that, under conditions favourable to the appearance of milk fever, no trouble arises until the sheep are driven, when cases may occur quite suddenly.

Parasites—Weaners carrying hair worms have been shown to extract less calcium from their feed. Blood levels of calcium may be consequently decreased. Hair worms may, therefore, predispose to milk fever, especially where other factors are also present.

Age of ewe flock—Observations have shown that milk fever becomes more prevalent as the age of the ewe flock increases.

Carbon tetrachloride—Drenching with this drug may produce a lowering of blood calcium.

Is milk fever confined to heavily pregnant ewes?—The greatest drain on blood calcium occurs normally in ewes near to lambing; besides meeting their own requirements, they have also to satisfy the needs of their rapidly growing unborn lambs. In the event of a shortage, the lamb takes preference over the mother. Generally speaking, therefore, ewes heavy in lamb are the most susceptible to any stress factor contributing to a lowering of blood calcium. However, ewes with lambs at foot, empty ewes, wethers, and rams may all succumb to the stress factors mentioned. Though outbreaks are far more common in pregnant ewes, all classes of sheep may be affected.

What precautions can be taken against an outbreak of milk fever?—Preventive measures are based on avoiding the conditions aiding the development of the disease. However, in spite of the best management, the weather, for example, cannot be controlled.

Particular care should be taken with ewes heavy in lamb.

Avoid over-fatigue and prolonged fasting with travelling animals. Likewise, if in-lamb ewes are being worked through the yards, special care should be taken to make sure that they are not subjected to long periods of starvation.

Where lush crop or pasture is to be grazed, allow sheep on to it gradually, giving them access for only a brief period at first. Where possible, roughage in the form of natural pasture, or hay or chaff, should always be made available. Hungry sheep are more susceptible to the effects of sudden change to lush grazing than are well-fed sheep.

Care should be taken in turning hungry sheep into paddocks containing a heavy growth of oxalate-bearing plants. If this cannot be avoided, turn them in only when they are fully fed. Sheep normally grazing in paddocks containing such plants usually do not have trouble, but after rain, causing sudden growth of these plants, they may be affected. Oxalate-containing plants on stock routes are a special danger to hungry travelling sheep and, where possible, should be avoided.

If the weather turns cold and bleak during shearing, don't let shorn sheep go, but bring them under cover, either under or into the shed. Give them shed space in preference to woolly sheep. Hay or chaff is helpful in generating body heat, and avoids prolonged starvation. Sheep with full stomachs are then less susceptible if they do have to be put out into the open before the weather takes up. Some sheepmen put a percentage of woolly sheep with shorn sheep to help them to keep warm.

Sheep fed on cereal grains require finely ground limestone added to their ration at the rate of 1-1½ per cent. of the grain.

While the control of internal parasites does not have the prevention of milk fever as its main objective, it helps in this, and should be based on seasonal and tactical drenching and rotational grazing.

How to Recognise It.

How do you recognise milk fever?—The diagnosis of milk fever depends primarily on the symptoms shown by affected sheep. These must be considered in conjunction with the chain of events leading up to the trouble.

Usually the affected sheep are down when first seen, and as you approach, they get excited and may rise or try to drag themselves along with their front legs. Sheep that are down often assume a characteristic position. They

lie on the chest with head extended forward resting on the lower jaw, and in many cases the back legs stretched out behind; in others, the head may be turned in on the flank. In the early stages, when sheep are able to get to their feet, they tremble while moving and soon collapse. Ewes in lamb are more susceptible than other classes of sheep, and they will often go down in the yards.

The pupil of the eye is dilated and the breathing faster than normal. Constipation is typical, although, if outbreaks have been precipitated by feeding on lush feed, scouring may be prevalent.

An animal that has gone down becomes drowsy, and eventually unconscious and finally dies; sometimes within four to six hours of first symptoms. Death may be delayed 24 to 48 hours. Food is usually regurgitated from the paunch (rumen) and runs out of the nostrils. When this occurs, the animal makes a snoring noise when breathing through the nose, or it may breathe through the mouth.

Few animals recover without treatment. Post mortem findings are not characteristic or striking.

Treatment.

What can be done to try to save affected sheep?—Treatment aims to restore the normal calcium concentration of the blood. Dissolve 10 oz. of calcium borogluconate in water and make the volume up to 2½ pints. Boil for 10-15 min. to sterilize. This makes sufficient solution for 20 injections. The dose rate is 50 to 100 ccs per sheep. Calcium borogluconate solutions can be purchased ready for use. Inject the calcium solution at blood heat under the skin. A response normally occurs within half an hour, when sheep will get up and walk away. Injections may be repeated within an hour. Animals that respond should be watched for 12-24 hours in case they relapse.

Should this treatment not be successful, obtain assistance from your Veterinary Officer or Local Sheep and Wool Adviser without delay.

All needles and syringes used for injections should be sterilized before use, by boiling in water for 15-20 min.

Always have calcium borogluconate on hand so that treatment is not delayed. It is better to store calcium borogluconate as powder rather than have the solution on hand, since on standing, mould growth tends to appear in the solution, unless some inhibitor has been added. Proprietary calcium solutions do not deteriorate during storage.

Pregnancy Toxaemia.

What has gone wrong?—The cause of pregnancy toxaemia is not yet fully understood. A drop in the level of sugar (glucose) in the blood before the onset of symptoms and during the very early phases of the disease is a constant feature. From experimental observations, it is thought that the deficiency of glucose in the blood damages the brain. Glucose is vital in the normal functioning of nerve cells in the brain, and these cells are damaged if deprived of sufficient glucose for too long.

What circumstances lead to pregnancy toxaemia?—In general, ewes in two opposite conditions are affected, that is, ewes over-fed and without sufficient exercise, and ewes with insufficient feed and losing condition as lambing approaches. A more or less sudden fall in feeding level near lambing will often cause an outbreak. Yarding over-night when forward in lamb, drought, a train journey, heavy droving, and, to a lesser extent, rapid changes in weather conditions (cold and wind), are all predisposing causes. A general run-down condition favours its onset; so do old age, poor teeth, heavy worm infestation, and other conditions, for example, heavy grass seed

infestation, which limits grazing through the pain and discomfort it causes when an animal moves.

What classes of sheep are affected?—The only sheep affected are pregnant ewes. Most of them are from one to four weeks off lambing, and many are carrying twin lambs. British breeds bear twins more frequently than do merinos, and are more commonly affected. Pregnancy toxaemia in ewes with single lambs is not uncommon.

Plate 1.

Ewe Showing Symptoms of Pregnancy Toxaemia. Note stance.

About 80 per cent. of the growth of unborn lambs takes place in the five or six weeks before lambing. This places a heavy demand on the ewe's blood sugar and other resources, and makes her susceptible to the disease. Ewes with twin lambs are even more susceptible.

What precautions can be taken against an outbreak of pregnancy toxaemia?—Precautions should be directed entirely along the lines of nutrition and management. In view of the fact that treatment of pregnancy toxaemia is not really satisfactory, prevention is doubly important.

The ideal feed intake for pregnant ewes is one which rises gradually to about the middle of the fourth month. Feed intake should then be considerably stepped up to meet the increased demands, at this time, of the rapidly growing unborn lamb.

Seasonal conditions largely determine the nutritional status of sheep in Queensland, and therefore considerably influence the occurrence of pregnancy toxaemia. If the feed is failing, hand feeding becomes necessary so that ewes at least maintain condition as lambing approaches. Avoid any sudden changes of feeding from good to poor or *vice versa,* in late pregnancy. It may be a good idea to draft off the poorer ewes in a mob, and hand feed them or put them in a better paddock.

If the feed is good and ewes are fat and not obtaining sufficient exercise, driving daily for an hour or two will avert the onset of the disease, or prevent losses if cases have appeared. It is a good idea anyway not to allow ewes to become overfat.

In general measures aimed at control, attention should be paid to ridding pregnant ewes of their internal parasites, since parasites may have an important bearing on the plane of nutrition and the general health of the ewe.

Curtail periods of starvation of pregnant ewes to an absolute minimum. This, of course, means careful handling of ewes at prelambing crutching or jetting, or at shearing time.

Diagnosis.

How may pregnancy toxaemia be recognised?—As in milk fever, diagnosis is based on symptoms and the history of the flock up to the time of the outbreak. Keep in mind also, the general circumstances under which pregnancy toxaemia is likely to occur.

Usually, the first signs of the disease are that ewes, heavy-in-lamb are found standing apart from the main mob. They appear dull and off feed. If approached, they show no fear and seldom attempt to move away. When forced to move, ewes will walk slowly with a staggering gait. Some ewes in the early stages appear to be blind and wander aimlessly about, walking into natural objects. They may stand with their heads pressed against fences, or held near the ground, often for hours at a time. Grinding of the teeth, and twitching of the face and ear muscles are often noticed, and there is always complete lack of appetite.

The ewe eventually goes down. Convulsions may occur. Finally, she enters a stage of semi-consciousness, that may last several days. Death commonly occurs between four and six days after symptoms first develop.

If sheep that have died are opened up, the most characteristic feature is the appearance of the liver. Almost without exception, the liver will be somewhat enlarged, and abnormal in colour. The colour varies but is much paler than normal—some shade of yellow-brown. The ewe is often carrying twin lambs almost fully developed. The intestines are frequently empty, and sometimes there are hard, dry contents in the lower bowel. The condition of the ewe is often poor or over-fat.

Treatment.

What can be done in an attempt to save affected sheep?—Treatment of pregnancy toxaemia does not often meet with success. However, if undertaken in the very early stages, some sheep may respond. During an outbreak it is advisable to inspect ewes *at least* once a day to detect cases early. Affected sheep that are down and lying on their sides are unlikely to recover.

Give affected ewes 4 oz. of glycerol mixed with 4 oz. of warm water as a drench once daily. Support this with injections of 4 oz. of a 60 per cent. solution of glucose under the skin every 12 hours. These injections should be given in several different places each time since the volume of fluid to be injected is so large. A 60 per cent. solution of glucose is made by gradually adding sufficient water to 1½ lb. of glucose to make the volume up to two pints. Boil this solution for about 15 min. to sterilize it. Two pints of this solution are sufficient to treat 5 sheep for 24 hours. Treatment should be continued until appetite returns to normal, otherwise relapses are likely. A sheep's appetite is always depressed for some days following fasting.

Good feed must be provided so that adequate amounts will be taken as soon as appetite returns.

In hot weather, shelter cases from the sun, and force them to take water (if necessary by drenching) until they will again drink voluntarily; about $1\frac{3}{4}$ to 2 pints a day should be sufficient.

When injections are being carried out, take care that needles, syringes, and solutions for injection are kept sterile, to avoid carrying infection through the skin.

under consideration. Hypocalcaemia can occur in all classes of sheep at any time, but pregnancy toxaemia only in pregnant ewes.

Pregnancy toxaemia is slow in onset, and odd cases continue to occur over a long period. Hypocalcaemia is sudden, and it is quite common for a large number of sheep to be affected in a short space of time.

In pregnancy toxaemia. sheep go down in a natural resting manner, and die some days after the first signs of

Plate 2.

Ewe Showing Advanced Symptoms of Pregnancy Toxaemia.

Which is it?

Milk fever and pregnancy toxaemia may easily be confused. How can they be differentiated?—To distinguish between milk fever and pregnancy toxaemia study:

(1) The history of the flock (especially seasonal and nutritional);

(2) The symptoms and post mortem findings of affected animals; and

(3) The course of the disease.

Where ewes with lambs at foot or sheep other than ewes are affected, pregnancy toxaemia does not come

illness. There are symptoms of dopiness, blindness, and stupor in the initial stages. In milk fever, sheep go down quickly, and death takes place within a few hours or a day.

An abnormal light colour of the liver, and the presence of twins suggest pregnancy toxaemia.

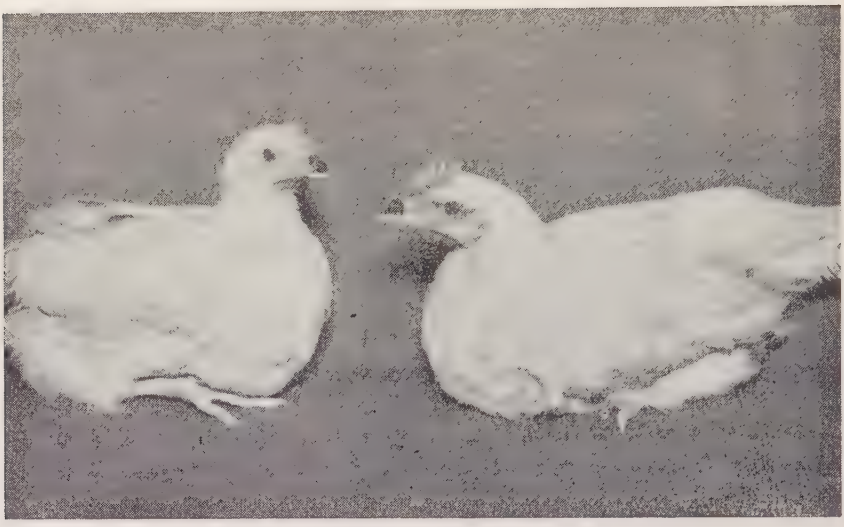
Where doubt exists in differentiating between pregnancy toxaemia and milk fever, or where indications are that some other disease may be involved, obtain the assistance of your Veterinary Officer or local Sheep and Wool Adviser as soon as possible.

A LETTER TO

DEAR Dad,—We finished lambmarking last week, doing 5,500 lambs for an overall 56 per cent.—not very good, but the season has been patchy! Many this year only got 30 to 40 per cent. As overseer I was entrusted with the knife and feel I have increased my skill a good deal. A point the boss kept me up to was that, when not using the knife keep it pressed flat against the outside of your right thigh. Then nobody walks on to the point of the knife and gets slashed. Just a little point, but it might save a man being in hospital for a month. As you have probably gathered, the boss doesn't miss a trick. We had plenty of knives and sharpened them on an oilstone frequently. On the occasions when the boss marked, he used the Luck knife with the hook on the end of the handle. I was very impressed with the boss's insistence on hygiene all through the operations; a much higher standard than I have seen on most properties. Clean overalls for everybody each morning we marked—the boss put a jackeroo on periodically to boil spare overalls and have them dry by nightfall ready for next day. Then each evening before we marked we rigged temporary catching and marking yards with hurdles and steel pickets in the paddock the ewes ran in. The same jackeroo who boiled the clothes had to sterilize knives and earmarking pliers each evening whilst others were mothering the ewes and lambs. Also during marking, there were buckets of disinfectant water for frequent hand-washing and to dip knives and pliers. As usual we used no dressing on the marked lambs, and the lambs being very young, mostly around three weeks, with some early ones six weeks, they healed quickly. Disinfectant was changed frequently when it became discoloured. All lambmarking was started at first light, and finished very early so as to give the lambs plenty of time to mother up. Special care was taken with the maiden ewes in a small holding paddock following marking, and a longer time to mother up was allowed. All tails were burnt after counting. During marking, we kept the rams' and ewes' tails in separate heaps. Ram and ewe lamb counts ran out about 50/50 with a few extra ram lambs. The boss says this is normal, and nature's way of compensating for a bigger mortality in male animals in the first year of life.

A few big ram lambs came in (chance get), some six months old. The boss marked them with the Burdizzo, although he said you could do them by calf-cutting them. I got a lesson on how to test the Burdizzo before using it on the rams. You put a piece of string between a fold of paper and put that between the jaws. If the Burdizzo severs the string cleanly without cutting the paper it is working well, and hasn't been overstrained as some of them become with careless use. With the Burdizzo you do one side at a time. Some of the neighbouring properties use rings, but the boss is happy to keep to the knife and good hygiene. All the best, Affectionately, BILL.

This is Brooder Fowl Pox



NOTE the fowl-pox lesions in the debeaking wound of the upper beak, extending to the nostril.

Fowl-pox virus has gained entry to the affected parts through scratches and abrasions caused by the wire mesh of the brooder. No doubt the wire of the cage had become contaminated with the virus from a previous group of chickens in the battery.

This outbreak occurred in July about two weeks after debeaking. The chickens were seven weeks old. Nearly all the flock of 200 chickens became affected and suffered a slight set-back.

Another way in which fowl-pox is transmitted is by the bites of virus-carrying mosquitoes, in which case, wart-like lesions develop on the birds' comb, wattles and eye-lids.

Outbreaks in future batches placed in the affected brooder can be prevented by vaccinating chickens under a week old with pigeon-pox vaccine. This is applied with a brush to the feather-follicles of the leg and does not upset the young chickens in any way.

—*P. D. RANBY,*
Veterinary Officer.

Growing Egg Fruit At Bowen

By E. F. TREE, Formerly Adviser in Horticulture.

The egg fruit, although something of a novelty in Australia, is a staple food in the warmer parts of Europe and New Zealand. The plant is one of the Solanums and is therefore related to the tomato and cape gooseberry.

Two varieties of egg fruit are grown in Queensland—Black Beauty and New York Spineless. Both are bushy plants which grow to a height of about 2½ ft. The stems are woody and carry some spines and large hairy leaves. The flowers are violet in colour and measure 1–2 in. across.

Black Beauty is the better eating variety and is very popular on local markets. The fruit is nicely rounded, with a glossy, dark-purple skin and very attractive appearance. However, it tends to wilt and become soft within a few days of harvesting and is therefore not particularly suitable for consignment to distant markets. As most of the fruit produced in Queensland is consigned to Sydney and Melbourne, New York Spineless is the more widely grown type at Bowen.

Commercial lines of seed sometimes contain many off-type plants and Bowen growers prefer to use seed from selected plants. Following selection over a period of several years, the strains now available are fairly uniform but there is still need for further improvement. When the

Plate 1.

Egg Fruit Plant Opened Up to Show the Fruit. Fruits have a smooth purple skin and grow up to 3 lb. in weight.

fruit is fully ripe, the seeds come away freely from the flesh and can be scraped from the half-fruits. The seed is washed and dried on the same day; if left over-night, it sometimes starts to germinate.

Market Outlets.

The egg fruit is definitely a warm weather crop. In southern districts, it is grown during the summer months but northern growers have the market to themselves in winter and early spring.

The annual demand for the fruit is increasing each year, possibly because of the numerous migrants who have arrived in Australia since the end of World War II. Many of these migrants come from southern Europe where the egg fruit is regarded as a staple food. Their partiality for the fruit is introducing it into Australian homes where it was previously almost unknown.

Although the market is expanding, it has its limits. Unlike tomatoes and bananas which can be sold in large quantities when prices are low, a sudden increase in egg fruit supplies may reduce prices considerably without increasing sales.

Seedbeds.

At Bowen, the seedlings are raised in beds established in late summer and autumn. It is preferable to construct the beds on land which has been under grass for some years or, failing that, on land which has not previously grown egg plants or related crops.

The soil is dug to the full depth of the spade and bedded up so that the surface is about 4 in. above the level of the surrounding soil. Surface water can drain away freely from such beds and the risk of waterlogging during the wet season is substantially reduced.

The seed is planted in rows 9 in. apart and covered with not more than ½ in. of soil. The bed is well watered immediately after planting and a grass mulch is then applied to the surface to reduce evaporation from the surface soil to a minimum. When the seedlings are about 1 in. high, the surplus plants are thinned out; sturdy, well-grown plants are worth a little extra space.

The normal wet season rains usually keep the soil moisture up to the plant but, if the seedlings run into dry weather, the beds may be watered twice a week. In about five weeks after planting, the seedlings are 4–6 in. high and ready to transplant into the field. At this stage, the beds are thoroughly soaked in the morning and transplanting is carried out in the afternoon of the same day. If the plants are lifted with some soil adhering to the roots, they suffer little or no setback after transplanting. Nevertheless, the seedlings should be wrapped in a wet bag from the time they are lifted from the seedbeds until they are set out in their field positions.

Field Management.

The implement used for inter-row cultivation determines the space between the rows and 5 ft. spacing is usual on farms with small tractors. Plants are spaced 2½ ft. apart in the row. Late summer rains normally supply all the moisture needed until about two months after transplanting when a furrow is opened-up on each side of the row, the soil being thrown up to the plants.

A basal fertilizer is applied in the planting furrow and lightly covered with soil before the seedlings are set out. It is usually a 5-13-5 mixture containing blood and bone, the rate of application ranging from 3–6 cwt. per acre.

The first side dressing is a water-soluble mixture with much the same

Plate 2.

Egg Fruit Graded for Size before Packing.

composition; it is applied when the first fruits have set and is distributed in the furrow opened up when the crop was hilled. The inter-row space is then broken down and levelled off by a horse-drawn scuffler with a length of weatherboard bolted to the rear tyne. The broad, shallow drain so produced becomes an irrigation furrow.

The second side dressing is evenly distributed over the surface of this irrigation furrow when the first-formed fruits are almost ready to pick.

Harvesting.

The egg fruit should grow to marketable size in about eight weeks. Growers close to the markets pick to size rather than maturity. At Bowen, however, the fruit is normally consigned over long distances and it is customary to let it develop on the plant almost to maturity. The mature fruit contains a fair amount of fibre and stands up to long train journeys without noticeable shrinkage.

At one time, egg fruit were invariably packed in bushel cases but nowadays, half-bushel packs seem to be more popular on the market. Some of the larger fruits are awkward to pack in these small cases.

Recipe.

For the connoisseur, here is a popular recipe:—

"Cut the fruit lengthwise and remove the seed. Place in a greased dish and bake in a moderate oven until the pulp is soft and lifts easily from the skin. Add to the pulp chopped parsley, two tablespoons breadcrumbs, one tablespoon chopped ham, one dessertspoon chili sauce, salt and pepper. Fill the shells with the mixture and top-off with rings of red capsicum. Bake in a moderate oven for 20–30 minutes.

Brucellosis-Tested Swine Herds

(As at 21st October, 1958.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "Sa Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
B. Osborne and Dr. J. W. Best, Miltown Stud Piggery, Warwick
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
D. Ludwig, Cainable, via Beaudesert

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood.
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
P. F. Ives, Capalaba
D. Ludwig, Cainable, via Beaudesert
J. C. Lees, "Bridge View" Stud, Yandina
R. Rhodie, Clifton
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
R. A. Collings, "Rutholme" Stud, Waterford
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Green Fingers

FOR the successful production of pineapples, the crop must be grown on a well-drained soil. If the texture of the soil is such as to impede drainage, root rots may become troublesome after an excessively wet season.

It follows, therefore, that when pineapples are planted in a soil with indifferent drainage, consideration should be given to laying out the area so that surface water is removed with the minimum risk of soil erosion. Furthermore, it is advantageous to plant on raised beds or hills which increase the depth of soil, through which the root system can penetrate and also improve internal drainage.

"Hills" can be easily constructed on ploughed land by throwing, say, three or four furrows together to form mounds at the required distance apart. The drill left in the inter-row region services as a surface drain.

During excessively wet seasons, such as those experienced in 1955 and 1956, pineapples suffer considerable damage from waterlogging in a wide range of soil types. Even soils which would normally be classed as well drained may be completely saturated before the onset of winter.

The after-effects of waterlogging in autumn and early winter are generally not noticed until plant growth is resumed in spring. Plants which, up to that time, appeared healthy, may then begin to show signs of wilting. As the season progresses, they may collapse if the weather is unfavourable for growth and steps have not been taken to promote development of a new root system.

Some of the affected plants may be firmly anchored to the ground. Nevertheless, the roots are practically all dead and the plant cannot respond to warm temperatures, adequate moisture and applied fertilizer.

—L. G. TRIM,
Adviser in Horticulture.

CAULIFLOWERS must be cut as soon as they reach prime condition if you wish to market top quality heads. If cutting is delayed, the heads tend to become ricey, discoloured or spread.

Although compact heads weighing from 4 to 6 lb. are usually a good selling line, weight and size are not a good measure of maturity. Quality of the curd is much more important. Delays in harvesting increase the risk of blemishes in the curd. These blemishes are the result of exposure to sun, rain, wind-blown particles of soil, insects, disease and low temperatures. All of these tend to produce an objectionable, dull-brown or yellowish colour in the curd.

Over-mature cauliflower heads should be discarded in the field, they only spoil the appearance of consignments and adversely affect sales.

—R. L. PREST,
Senior Adviser in Horticulture.

WHEN one considers the amount of vegetative growth produced by a banana plant in the course of one year, it is not difficult to realise that the nutritional requirements of this plant are heavy. However, they are much heavier during part of the year than would actually appear. During the period of active growth and leaf production of the plant the roots gather from the soil, and the leaves take up from the air the raw materials that the plant manufactures into starches, sugars and protein. These complex substances are partly used in the growth processes of the plant itself

and partly stored in the corm for use later by the developing bunch and the following sucker. After the bunch is thrown, the leaf area of the plant is usually reduced fairly rapidly as older leaves die. This drastically reduces the ability of the plant to synthesize more plant foods, and in any case as the leaves become older they function less efficiently. So during the period of development of the bunch, reserve supplies in the corm must be used extensively. If these reserve supplies are small both the bunch and the following sucker will be starved. If, on top of low reserves the plant loses all its leaves from some disease or other calamity and cannot synthesize any additional food requirements, then the bunch will just fail to develop into mature fruits.

These observations should make it clear that every possible effort must be directed towards encouraging a vigorous and efficient root system and maintaining a large and effective leaf area. The greatest possible amount of excess plant food can then be stored against later needs. The way to do this is, of course, to make sure that plant nutrients in the soil are maintained at a high level and that the soil retains sufficient moisture at all times for the plant roots to be able to function in assimilating these nutrients.

One very important point is that the nutrients should be available to the plant early. Remember it is only during the period while the plant is still producing new leaves that plant food can be stored. After the bunch is thrown the process is reversed and the store is gradually used up.

What plant nutrients are required and in what quantities? In the north, on soils of normal fertility, mixtures of about 7:10:10 or 8:10:8 formula have been found quite satisfactory but where soil nitrogen is high, as we sometimes find on the rich alluvials, a mixture of the order of 4:12:12 is more satisfactory. Nitrogen must be used with a certain amount of caution. Granted it will tend to produce lush growth but, if it is overdone, and particularly if it is used too lavishly during the period of bunch development, the quality of the fruit can be adversely affected. Fruit so treated becomes soft and breaks down very quickly when subjected to the ripening process. It is liable to become a complete loss to the grower.

Rates of application giving the best general results are in the vicinity of 1-2 lb. for each plant as a base dressing at planting, followed by side dressings of 1-2 lb. for each stool after two months and four months.

Winter or spring planting is most usually practised in the North so the third fertilizer application would fall about December—just before the normal wet season. Leaching of the soil is fairly excessive during our tropical wet seasons so the losses must be made good by another side dressing in about early April, also of 2 lb. for each stool. This dressing will be needed very largely by the ratoon sucker which you will probably set about the same period.

—*S. E. STEPHENS,*
Horticulturist.

Check Your Irrigation Equipment. Irrigation demand will increase during the summer months so check over your equipment before the rush starts. Check pump efficiency and output by noting the time taken to fill a tank of known capacity. If delivery rate is low, have the pump overhauled. Check over the main and spray lines. Repair leaking pipes and defective couplings, insert new rubbers where required in pipes, bends and elbows and repair or renew faulty sprinkler heads.—*A. NAGLE, Irrigationist.*

Beef Cuts for The Housewife

By A. A. SEAWRIGHT, Divisional Veterinary Officer (Slaughtering).

In a previous article, "The Beef Carcass and its Cuts," the breaking down of the beef carcass into its chief cuts was described. Now it is proposed to deal with the retail cuts. Photographs of the more important of these cuts might assist housewives to identify the cuts as they see them in the butcher's shop.

The pieces of meat so commonly seen in the butcher's window and on hooks in his shop are really the muscles of the bovine carcass. These cuts of meat from different parts of the carcass have variable eating qualities, probably the most important of which is tenderness. Tenderness is related to such factors as pre-slaughter treatment of the live animal, its state of nutrition, age at slaughter, and "ripening" procedures after slaughter.

However, all of these things being equal, some parts of the meat cut from any carcass are always likely to be more tender than other cuts from the same carcass. The tenderer meats come from muscles which contain less of the tough fibrous material and gristle than other muscles and are less used. Every housewife knows that some cuts must be cooked more vigorously than others in order to make them tender and palatable. The reason is that the fibrous material must be rendered soft and soluble and so, while a few minutes under the griller will serve for fillet steak, long periods of stewing or roasting will be required for chuck steak or roast.

At one end of the tenderness scale is fillet steak and at the other end is leg or shin beef.

Other factors contributing to eating quality in meat are flavour and juiciness. Flavour develops with the maturity of the animal, and juiciness is most probably related to the physiological and nutritional condition of the animal at slaughter. These are factors over which the retail butcher has little or no control but the cuts which show a bright red meat colour

Plate 1.

Outline of the Beef Carcass and its Cuts.

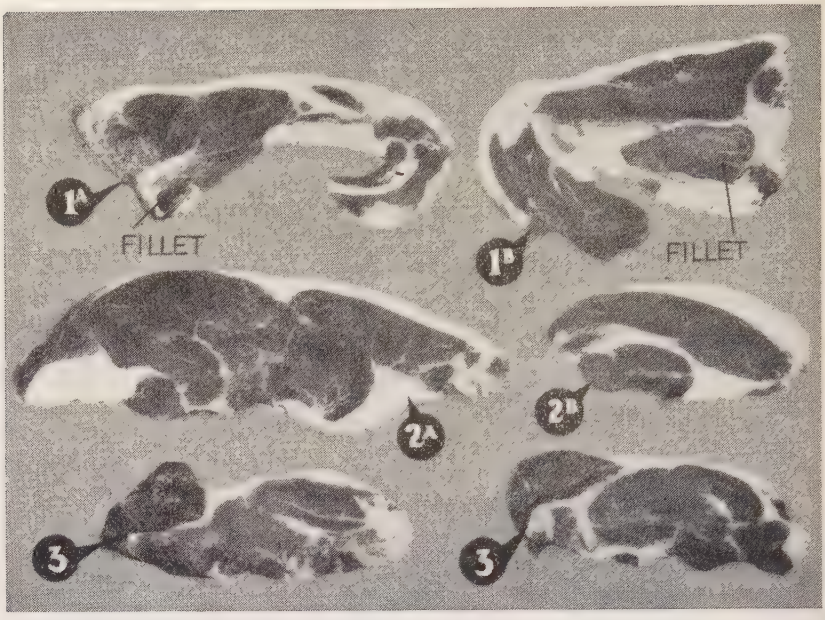


Plate 2.

Cuts from the Loin, Rump and Fillet: 1A—Sirloin, T-bone or porterhouse steak cut from nearer the rib end; 1B—Sirloin, T-bone or porterhouse steak cut from nearer the loin end; 2A—Rump steak, cut from the centre of the rump; 2B—Rump steak, the point of the rump; 3—Fillet steak, cut in cross section.

and creamy white fat of even thickness are those most likely to be best for flavour and juiciness.

From Plate 1 it will be seen that the cuts derived from the hindquarter are the rump, loin, fillet, topside, round or thick flank, silverside and leg beef. When the hindquarter is broken down, the retail cuts, the pieces of meat the housewife buys, are prepared.

HINDQUARTER CUTS.

In Plates 2-5, the cuts have been prepared in the conventional way in order that their general shape and characteristics may be recognised readily. The carcass from which they were prepared was first quality young ox beef, so the proportion of fat to lean meat in grilling cuts and roasts would be that considered most desirable by the average consumer.

Loin cuts such as sirloin steak and roasts, porterhouse steak, T-bone steak and rump steak and fillet are those cuts of beef which are the highest priced and most in demand by the consumer. Retail cuts of these meats are shown in Plate 2.

Loin Steaks.

The general shape of the sirloin cuts is shown by 1A and 1B in Plate 2. It will be noted that this cut consists of a large bone shaped like the letter "T" at one end, an even layer of firm fat over the outer surface, two elongated oval "eyes" of meat, one on each side of the "T-bone" and a short tail consisting of alternate layers of fatty tissue and lean meat.

The proportion of the eye of meat marked "fillet" is somewhat greater in the cut 1B than in 1A. The fillet

or under cut of the loin is largest towards the hind end and tapers off towards the fore end or ribs. Cut 1B then was taken from near the rump end of the loin and cut 1A from towards the rib end. The relatively large amounts of fat seen in the lower concave edge of the cut is part of the kidney fat remaining in the carcass after removal of the kidney. In a well-conditioned carcass, the butcher trims most of this fat away for rendering into dripping.

In 1B there are several white specks of fat deposited in the large eye muscle. This effect is referred to as "marbling" and indicates the prime, well-conditioned carcass. In some butchers' shops the "tail" of the sirloin is removed completely but usually the amount of "tail" as shown in 1A and 1B is left remaining on the cut.

Rump.

When removed from the loin, the rump contains some of the aitch bone and tail bone. For marketing in retail cuts, the rump is boned out and cut into steaks as shown in Plate 2 (2A and 2B); 2B is the first cut of the rump and is cut from the tail end. It can be seen that the rump steaks cut conventionally in cross section increase in size from the tail end or first cut forward. The more representative cut of rump steak is 2A, being arc-shaped with an even layer of firm fat covering most of the convex outer surface. Rump steaks come from that large expanse of muscle, the buttocks, and when sold across the counter, usually contain no bone. Occasionally a small piece of bone is left on one end as shown in 2A. The areas of fat on the under side surface is that fat left after the channel fat has been trimmed out. Rump steak from a well-conditioned animal such as this one shows a fair degree of marbling and a bright red colour and a fine grain. Cuts of rump steak are particularly well suited to grilling and frying as they contain very little fibrous material or gristle.

Fillet.

The fillet steak is usually removed from underneath the rump and loin. The fillet is a long muscle which extends under the backbone on each side from the last few ribs to the region of the cup joint of the hind leg. The muscle begins as a few small tendinous attachments to the ribs, and increases in size at it passes backwards. Only a very small proportion of the meat in any carcass is fillet and butchers cannot always supply it when customers ask for it.

In Plate 2 (3) are slices of fillet steak cut in the conventional manner. The cut is roughly oval in shape and is paler in colour than the other grilling cuts, rump and sirloin. Fillet may have some fat associated with it but frequently has not. The darker, triangular-shaped piece on the left hand corner of 3 (in Plate 2) is actually part of the flank muscle which is frequently cut as part of the fillet. The main characteristic of fillet is its extreme tenderness due to the relative absence of fibrous material from this muscle. While fillet is a very tender and palatable cut, it has not the flavour of rump steak or T-bone and many people prefer these latter cuts for this reason.

The remaining cuts of the hind-quarter are the silverside, topside, round and leg beef. Silverside and round are both used for making corned beef, while round is frequently sold as round steak which finds popular use in stews and casseroles. Both round steak and topside may be grilled or fried but as both these cuts contain a high degree of fibrous material and large, coarse muscle bundles, they are by no means as satisfactory for preparation of grills as rump, sirloin or fillet.

Silverside.

The silverside is that large flat muscle situated on the lateral surface of the butt of the hind-quarter. It is

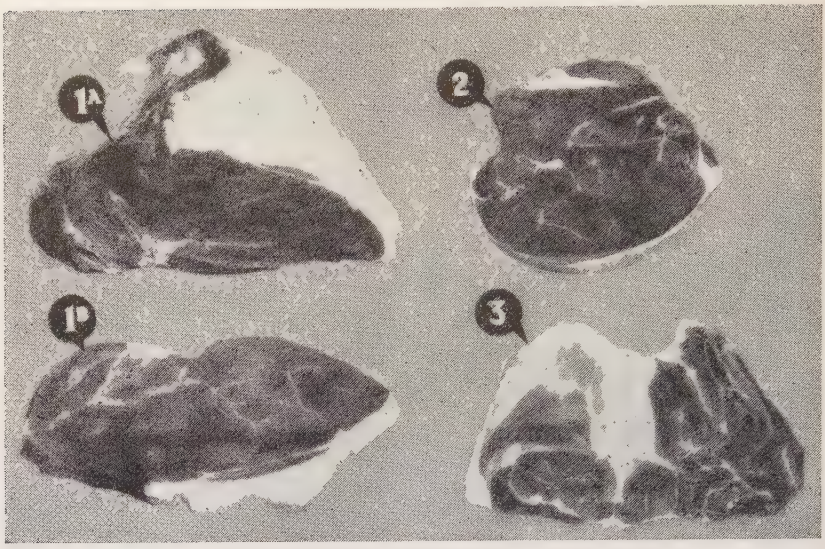


Plate 3.

Cuts of Topside, Round Steak and Leg Beef: 1A—A whole topside; 1B—A slice from the topside 1A; 2—A cut of round steak; 3—Leg Beef.

particularly well suited to curing as the large artery which supplies blood to the whole muscle is readily found. Curing brine is then pumped through it. The silverside is then cut into good sized chunks weighing a few pounds each, pumped again with brine and left in a tub of brine solution until sold to the customer. The exterior surface of the silverside is usually covered with a thin layer of fat.

Plate 3 shows cuts of topside, round steak and leg beef.

Topside.

The topside is that large prism-shaped cut situated in the middle part of the thigh. Plate 3 (1A) shows the general shape of the topside which at its base has, broadly speaking, three sides, one of which has a fat covering. The first cut of the topside (1B) can be seen, when compared with rump steak to have a much coarser grain and to contain far more fibrous material. From a well-conditioned animal, the fat deposits are more inclined to be lumpy than on the rump which is a cut for which topside may be confused. Topside is very popular as an ingredient for fresh meat stews or for braising and is often bought in a larger chunk for roasting.

Round Steak.

Round steak is also referred to as thick flank and it is that muscle situated on the front part of the thigh. As a main cut it is also shaped like a prism, but is smaller and thicker usually than the topside. In Plate 3 (2), a typical slice of round steak is shown. The round, regular, exterior surface with its thin cover of fat gives the cut the name "round." A feature in recognising round steak is the pattern of the gristle between the muscles of this cut. Like topside, round steak is of coarser texture and is quite unsuitable as a grilling meat. It is most suitable for corning or stewing.

Leg Beef.

Leg beef is shown in Plate 3 and is characterised by the large amounts of fibrous material and gristle between the

lean meat portions. This meat is extremely tough and is most frequently sold for soup meat or pets' food.

FOREQUARTER CUTS.

The cuts available from the forequarter of the beef carcass do not in general provide much meat for grilling purposes but give excellent meat for stewing, roasting and braising purposes. The most popular grilling cut which is derived from the forequarter is the rib fillet which is simply the centre of the rib roast. The conventional idea of the roast is the rolled and skewered rib or sirloin roast, so familiar in the display window of the retail butcher's shop. Some people experience difficulty in distinguishing a rib roast from a sirloin roast.

Roasts.

In Plate 4, 1B is a sirloin roast and 2 is a conventional rib roast. The sirloin roast is prepared from a sirloin cut such as 1A. In such a cut, the bone as in 1C is trimmed out and the meat cut derived therefrom is rolled and skewered as in 1B. Rib roasts when cut from the forequarter also contain the associated bony part of the backbone together with one or more ribs. The meat is trimmed away from the bones here also and the roast rolled and skewered as in 2.

It will be noted that both roasts consist in the main of eye muscle surrounded by the muscular and fatty selvage. In the sirloin roast a small portion of the undercut of the loin is also included in the centre of the roast. The sirloin roast is usually a meatier roast than the rib roast and does not have those alternate layers of lean and fat which are so characteristic of the rib roast. Both types of roast are excellent cuts and each has its adherents. A good roast, whether sirloin or rib, should have no more than from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. of fat surrounding it.

Another type of roast which is fairly popular with some consumers is the chuck roast. The chuck roast is prepared from the forequarter ribs towards the neck end. The ribs towards the neck end are partially covered by the large chuck muscle and the origins of the muscles supporting the neck of the beast. The chuck muscles support and attach the fore limb to the chest.

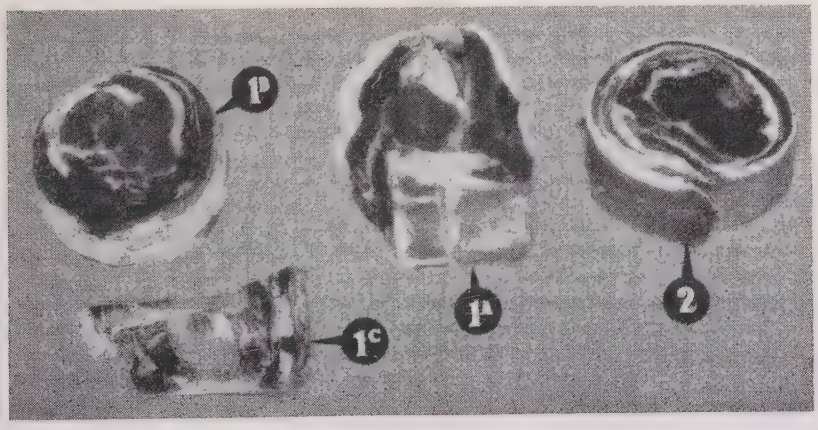


Plate 4.

Conventional Beef Roasts: 1A—Sirloin roast, bone in; 1B—Sirloin roast, rolled and skewered; 1C—Bone from cut similar to 1A; 2—Rib roast, rolled and skewered.

Plate 5.

Cuts from the Beef Forequarter: 1—The undercut of the blade; 2A—Blade steak cut in the direction of the muscle fibres; 2B—Blade steak in cross section; 3—Chuck steak; 4—Shin beef.

The chuck roast is an essentially meaty roast but it is made up of lean which contains considerably more fibrous tissue than in the rib and sirloin roasts. Accordingly the chuck roast while of excellent flavour does not compare with the rib and sirloin roasts from the point of view of tenderness and palatability.

In Plate 5 the main conventional forequarter beef cuts are shown.

Blade.

These forequarter cuts, blade, undercut of the blade and chuck steak consist of relatively coarse muscles and contain appreciable amounts of white tissue as can be seen. These cuts are used chiefly for stewing, braising, mincing and occasionally roasting.

In Plate 5 (1) we have the undercut of the blade. This meat is trimmed from the under surface of the blade bone and is characterised by the appearance of a broad sheet of tissue towards the lower end in this photograph. At this end the cut is about 1 in. in thickness and gradually increases in depth to 2 to 4 in. at the other end. Different cuts of blade steak are shown by 2A and 2B. Blade steak cut in the direction of the muscle fibres in 2A has a characteristic unmistakable appearance. The main cut is prismatic in shape, starting extremely thin at one end and gradually increasing in thickness to about 4 in. at the other end. From this photograph of the cut surface the white tissue passing from the thin to the thick end is readily appreciated. The displacement of the muscle fibres also is quite characteristic as they pass obliquely from the white tissue to the upper and lower surfaces of the cut. Blade steak is not usually cut with a covering of fat on the outside edge as this fat is usually

left on the ribs in order that it might be used as selvage for rib or chuck roasts.

In 2B is shown the cross sectional cut of the blade and some consumers prefer to have their blade cut this way to that of 2A. The white tissue so obvious in 2A is also present in this cut showing as a horizontal line from side to side through the centre. Blade steak is known for its gristly nature and as such may be confused with the round steak of the hindquarter. However, careful attention to the disposition of these white tissues will enable a fairly ready differentiation to be made. A point noticeable in both 2A and 2B is the very smooth upper surface of the blade.

Chuck.

Plate 5 (3) shows a piece of chuck steak cut in the usual manner. Chuck is cut in the direction of the rib on the lower part of which these muscles lie. The cut section of chuck presents an irregular appearance and to the inexperienced observer is often difficult to recognise. Often an impression of a rib may be noticed on its underneath surface.

Chuck contains a considerable proportion of tough tendinous tissue and usually very little fat is associated with it. The chuck in the living animal lies on the ribs underneath the shoulder blade and, as a cut of meat, is too deep to be cut with a layer of selvage on top like rump or sirloin steak. However, with skilful knife work it is possible for the butcher to prepare a chuck roast rolled with an outside layer of fat.

These muscles, from which are derived the chuck and blade, are used extensively by the animal when alive, and the meat later prepared from them is usually darker red in appearance than the rump, loin and silverside of the hind quarter.

Shin.

The shin beef as in Plate 5 (4) is very similar in structure to the leg beef of the hindquarter and is sold usually as soup meat or pets' food. It is noticeable that the shin beef contains the same high proportion of tendinous tissue as is such a feature of the leg beef.

Skirt and Brisket.

Other cuts derived from the forequarter not previously mentioned are the skirt steak and the brisket. The skirt steak is attached to the inner surface of the last few ribs as they meet the posterior part of the breast or brisket region. This flap consists of dark red, tough muscle covered by a glistening, transparent membrane which may be stripped off without great difficulty. Skirt steak is inclined to be too tough to be relished as a grilling cut and is usually included in minced or ground beef.

Brisket is a great favourite with most consumers who enjoy corned beef. The brisket comes from the breast region of the forequarter and is usually sold boned out and rolled or in flat slabs. Brisket consists of alternate even layers of fat and juicy lean meat. The fatty layers of the brisket are characterised by the many tiny fibrous strands included in it and these have the effect of causing the brisket fat to remain relatively firm and to retain its shape.

Storing Vegetables at Home

By C. D. STEVENSON, Assistant Physiologist.

There are a number of rules, which, if observed by the farm housewife, make storage of vegetables in the home a rewarding operation.

TO ensure successful keeping of vegetables, it is essential to use only sound, mature produce. Handling before storage should be kept to a minimum and all cut, bruised or otherwise injured or mis-formed produce should be rejected and placed aside for immediate consumption.

For good results the stored material should be examined frequently during the storage period. If any rots or forms of breakdown are noticed, the affected produce must be removed immediately, since contact with sound material can result in contamination, and further losses.

Bear in mind that rotting vegetation produces heat, which will increase air temperature in the vicinity, resulting in the loss of storage life.

Potatoes Easily Kept.

For household purposes the potato is the most easily kept vegetable, as it has a fairly long storage life. Before digging, potatoes should be allowed to mature fully. A good indication of maturity of this vegetable is the presence of a firm, unbroken skin which is not easily torn by rubbing with the fingers.

After digging, the potatoes should be well dried before placing in storage.

Natural air circulation is very important during the storage period since it results in lower temperatures around the produce. For this reason, if space is available the potatoes should be spread out over a large area not more than two or three high. If room is scarce they should be packed loosely into cases with spaces between the side boards of the case.

A relative humidity of about 90 per cent. is ideal. If humidity is too low, wilting can occur and result in severe shrivelling. The humidity should be increased by sprinkling the floor around the potatoes with water, but care should be taken not to wet the potatoes as this favours growth of moulds. As high humidities favour attacks by rots, very damp storage should be avoided.

Exposure to light hastens sprouting; therefore during storage the potatoes must either be shaded or the storage area should be kept dark by other means.

There are a number of commercial preparations available which can be used to prevent sprouting during storage.

It may be found that, during winter, the potatoes become sweet during storage and are thus unsuitable for cooking purposes. This can be overcome by keeping the potatoes at room temperature for one to two weeks before use. Under these conditions this vegetable can be kept for periods up to three months.

Plate 1.

Cabbage in Plastic. Leaf vegetables packed in plastic bags and stored in a refrigerator will retain their freshness for longer periods than when unwrapped.

Onions Also.

Onions are another vegetable with a long storage life. Their storage is similar to that of potatoes. They must be fully mature; withering of the leaves is a good indication of this.

After digging they must be dried; sun drying with frequent turning is quite satisfactory and during this period all damaged and thick-necked bulbs should be removed.

The most satisfactory ways of keeping onions is by storage in open-sided cases, in open weave bags or by spreading loosely over the floor as for potatoes. They must be kept in the dark to prevent sprouting and during the storage period any sprouts present should be removed.

Unlike potatoes, a dry storage area with a low humidity is required. A relative humidity of about 70 per cent. is ideal. Onions under these conditions can be kept for periods up to six months.

Pumpkins and squash behave similarly in storage, with pumpkins keeping about two months and squash up to three months.

Both vegetables must be mature at the time of harvest, and an indication of maturity is the presence of a hard, dry skin. Tapping with the fingers gives a dry hollow sound in contrast to a soft pulpy sound when the vegetables are immature. A warm dry place is necesary for storage and they are not affected by light.

Root Vegetables.

Root vegetables such as carrots, beetroots, parsnips, turnips, and so on, are kept in the same way. After pulling, they should be trimmed to remove foliage. To prevent wilting, they are

usually buried in moist sand, and kept in cases in cool places. Regular waterings are necessary to keep the sand moist. Held in this way they will remain useable for some months.

Leaf Vegetables.

Leaf vegetables such as lettuce and cauliflower generally have short storage lives, and should be kept in the refrigerator. Their storage life can be improved by packing them in plastic bags before placing them in the refrigerator. Before storage, all bruised leaves should be removed by trimming, and the curds of the cauliflower covered to protect them from discolouration caused by bruising. These vegetables can be kept under these conditions from two to three weeks.

Cabbages have a longer life and may be held for short periods at atmospheric temperatures. They should not be trimmed too closely as the outer leaves protect them from damage. However, at ordinary temperatures they will yellow badly and for this reason refrigerated storage is more satisfactory. In plastic bags they can be kept in the refrigerator for periods up to six weeks in excellent condition.

Tomatoes' Short Life.

Tomatoes have a very short life and ripe tomatoes must be kept in a refrigerator to obtain their maximum storage life of about a week. Green tomatoes will ripen slowly if placed in a warm part of the refrigerator and can be kept for periods up to four weeks when they should be "eating ripe." However, regular inspections are necessary to remove any fruit which may develop rots. If green tomatoes are kept at too low a temperature they will not ripen satisfactorily and it is generally more satisfactory to hold them at atmospheric temperatures until they are half coloured before storing them in the domestic refrigerator.

Beans and Peas.

Beans and peas are not suitable for long storage and must be kept in the refrigerator if their maximum life is to be obtained. Both vegetables keep better if placed in plastic bags and it is often an advantage to shell the peas and string and slice the beans, and store them in a bottle in the refrigerator.

If peas are kept too long at air temperature they sweeten and their taste is impaired.

The storage life of beans under ideal conditions rarely exceeds a week whilst peas may be kept for two weeks.

Unless storage space is limited, vegetables should not be stored with dairy products or eggs as they may become tainted by the odours given off by the stored vegetables.

Similarly, apples have been known to become tainted from storage with cabbages, potatoes or root vegetables. Cabbages or turnips should not be stored under living quarters, if possible, as they give off unpleasant odours.

Question: "A.N.," of Lowood, asks about the planting rate of golden tares in association with oats.

Answer: Vetches or tares are frequently grown in association with such cereals as wheat, oats, barley or rye. The usual rate of planting is about 15 to 20 lb. of tares to 30 lb. of cereal per acre.

Keeping Guinea Pigs as Pets

By G. C. SIMMONS, Senior Bacteriologist, Animal Research Institute, Yeerongpilly.

OF ALL the animals domesticated and treated as pets, guinea pigs are perhaps the most docile and easily kept. They are therefore excellent pets for quite young children.

These curious animals, known scientifically as *Cavia porcellus,* are native to the Andes Mountains in Peru. The common name used in some countries is cavies but in Australia they are known by the somewhat inappropriate name of guinea pigs; inappropriate because they are not pigs and they have nothing to do with Guinea. Nevertheless the females are called sows and males boars.

With all animals there are different types and breeds, and so there are different types of guinea pigs. The one reared in practically all laboratories for scientific research is the English or smooth short-haired type, but in zoos and pet shops it is not unusual to see the Abyssinian type, which has hair arranged in several rosettes scattered over the body and head. A third type, the Peruvian, has long fine silky hair spread over the head, face and body. This, and the Peruvian Silky, which has short hair on the head and face, and long hair on the body, are only rarely seen here.

Guinea pigs have many different coat patterns, ranging from pure white to mixtures that may include black, light and dark tan to tortoise-shell tonings.

Value of Guinea Pigs.

Most people realise the value that a pet may have in the eyes of its owner, but besides being a pet the guinea pig has other uses.

Centuries ago guinea pigs were domesticated and used as food by Indians in Peru. They were taken to Europe where they were kept as pets, and later used in scientific laboratories. The first person to do this is not known but it is known that large numbers of guinea pigs were used for experiments from about 1870 onwards by bacteriologists, including such famous ones as Pasteur and Koch.

Since then they have become one of the most extensively used animals for experimental purposes, not only for the study of infectious diseases but also for research on vitamins and other nutritional factors.

A question often asked is, "Why are guinea pigs preferred by scientists?" Any animal which is docile, small, not expensive to feed, breeds readily and can be kept free of disease without too much trouble is suitable for experimental purposes. The guinea pig satisfies these conditions admirably.

Moreover, the constant continued use of these attractive animals has enabled scientists to assess their limitations and reactions to a fine degree. The benefits to mankind and his livestock resulting from the use of guinea pigs are incalculable.

Plate 1.

A Guinea Pig In A Coat Pocket. Besides being an excellent pet, the guinea pig has benefited mankind to an incalculable degree.

—D. McGavin, photo.

Life History.

The young guinea pig is born fully haired, with eyes open and with teeth. An hour or two after birth, it will be moving freely around the cage and by the second or third day will be eating solid food. The litter usually contains two or three but may contain up to six and on rare occasions it may even exceed this number.

With an ample supply of feed, and milk from its mother, the weight of the guinea pig will rapidly increase until it reaches about half a pound when a month old. It will suck its mother for about three weeks but when older, or if its mother dies before three weeks, it readily seeks milk from any other lactating sow. If it is desired to separate them, the best time to wean the young is at three to four weeks of age.

If it is a boar, sexual maturity will be reached at about 60 days of age; if a sow, at about 35 days. However, it is not advisable to mate a sow until she is about three months old. At this time she will weigh about a pound.

Growth continues up to 18 months when the fully grown adult will weigh between 1¾ and 2½ lb. Young may be produced by the sow until she is five years old but after three years of age breeding is irregular.

Old age approaches at five to six years although guinea pigs have been known to live for seven years.

How to Feed and House Them.

Guinea pigs should have quarters free of draughts and at a temperature of not less than 65 deg. F. Too much moisture is also undesirable and

predisposes to the occurrence of disease. Cages or hutches should be placed and constructed so that dogs and cats cannot harm the animals inside and to prevent entry of mice and rats that may introduce disease.

Two systems of housing may be used, either on grass or inside cages where all feed is supplied.

If fairly large grassed areas are available, a hutch can be made with a bottom of wire netting of ¾ in. mesh through which the guinea pigs may eat the grass. The sides and ends should be of wood to prevent draughts and if the top is also covered with wire netting provision should be made for a covering to provide shade and keep out rain.

A hutch about 30 in. long by 20 in. wide and 12 to 15 in. high will house several animals.

As the hutch must be moved daily, to prevent disease and to provide grass for feed, it should be reasonably light in weight.

Water should always be present and unless the grass is of good quality, additional feed in the form of crushed grain, wheat, bran or, better still, one of the pelleted foods sold for chickens should be provided.

Just enough of these supplementary feeds should be fed in a tin once daily so that all is eaten before the next feed.

If the grass is not plentiful and green, additional green feed should be given. This is particularly important as guinea pigs must have a regular supply of vitamin C to survive. Pieces of pumpkin may be used if no fresh green feed is available. Thistles, lucerne, lettuce and cabbages are especially relished.

Besides being housed in movable hutches they may also be kept in wooden or metal cages with a wire front or top for viewing and feeding the pets.

The management for this type of housing differs in two important aspects from the one previously described. As the cages are not moved, bedding must be supplied and regularly changed. Bedding may be dry, clean straw, wood shavings or wood wool. It should be changed once weekly and preferably twice weekly if the weather is wet and humid.

Also as the guinea pigs are not grazing on grass as in the movable cage system, care should be taken that ample supplies of fresh green feed are available.

As before, water should always be available and supplementary feeding with grain or pelleted food is desirable.

Plate 2.

A Guinea Pig Eating Thistle. Guinea pigs must have a regular supply of vitamin C.

—D. McGavin, photo.

Guinea pigs often like apple or the green tops of vegetables.

The water containers should be checked daily to see that sufficient is present, and the container should be scrubbed once a week with soap and water. The container for the water may be a metal, enamel, china or glass bowl or a water bottle similar to the

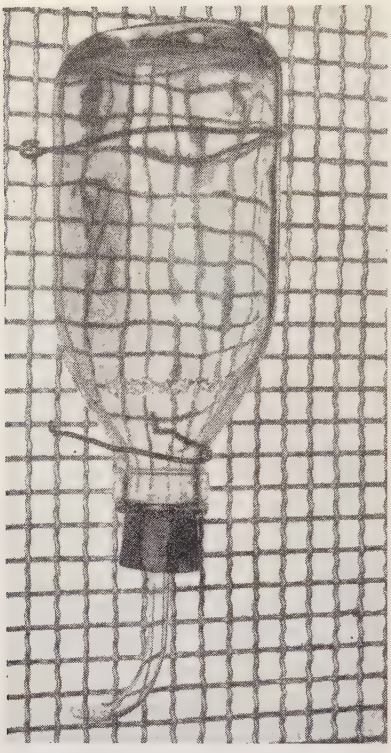


Plate 3.

Arrangement For Watering. A milk bottle closed with a rubber stopper, through which is passed a single glass tube with the free end curved.
—*D. McGavin, photo.*

one shown in (Plate 3). This may be constructed quite easily from a soft drink or milk bottle, rubber stopper and a piece of glass tubing.

Points on Breeding.

One boar may be mated with five or six sows. The sows have an œstral cycle of about 15 to 18 days. Therefore, if controlled breeding is desired, the boar should be separated from the sow about 20 days after mating.

In laboratory colonies it is the practice to leave the boar with the sows continuously and under this system of mating the sows re-mate within 24 hours of giving birth to a litter. Four or five litters may be produced in a year.

If feed supply is not plentiful, bread soaked in milk may be fed to the sow a week or two before and after the litter is born. The gestation period is 65 to 72 days.

Handling Hints.

Guinea pigs are docile and timid animals. Usually when the cage is approached there will be a chorus of squeaks. If handled gently two or three times a day by the same person, they will rapidly become quite tame.

To pick them up, use both hands, placing one hand over the shoulders so that fingers and thumb are around the neck, while the other hand is used to support the hindquarters. No struggling will occur if they are not held tightly. Only under extreme provocation will they bite. They may be gently lifted and placed on your lap where they will sit quietly. They may also be trained to stand for food.

Smooth haired English type guinea pigs should have a smooth, glossy coat and this may be enhanced by brushing with a soft brush, followed by smoothing the hair with the palm of the hand.

Diseases.

In common with all animal species, guinea pigs suffer from disease, but this is grealy minimised if they are kept under proper conditions.

Guinea pig diseases are often difficult to diagnose. An expert trained in animal diseases such as your nearest veterinary surgeon is the best person to consult. Few guinea pig diseases are transmissible to man.

Nutritional diseases such as scurvy may be prevented by supplying ample supplies of fresh green feed. This should not be allowed to decompose in the pen, and the feed remaining from the previous day should be discarded before the animals are again fed.

There are several diseases caused by bacteria which are important. One of these, known as salmonellosis (paratyphoid), may be transmitted to guinea pigs by contact with rats or mice or with fæces or urine from these vermin. It is essential, therefore, that mice and rats be prevented from entering the pen and that feed and water do not become contaminated with excreta from these and other vermin such as cockroaches.

The first litter of a sow is usually weaker than the subsequent ones, so if any young of the first litter die there is no cause for alarm as subsequent litters should thrive.

Boars sometimes fight, resulting in scratches and cuts. These should be bathed with an antiseptic and kept clean to prevent formation of abscesses beneath the skin.

Respiratory infections occur but chances of this happening are greatly reduced if cages are kept dry, warm and free of draughts. Overcrowding is most undesirable.

If disease constantly recurs, the pens or the animals are harbouring the infectious agent. Under these circumstances the animals should be destroyed and the pens burnt, or scrubbed, disinfected and left empty for three months, before obtaining new stock. If possible new guinea pigs should be obtained from a colony known to be healthy, and kept isolated for thirty days. If no ill health is noticed during this period, the animals may be put together.

It is not wise to keep a sick guinea pig as there is a risk that other animals may become infected.

Guinea pigs, like all pets, require attention but they will prove interesting if the necessary time and patience is taken to study their habits, likes and dislikes.

NOTE TO SMALL BOYS: Departmental Laboratories do NOT supply guinea pigs.

Query on Veldt Grass

Question: I have a variety of soil types on my property and should like to know how a strain of veldt grass would suit for fat lambs and vealers.—"K.L." (Memerambi).

Answer: There is a strain of veldt grass known as "Unarlee" which has received some prominence lately. Down in the southern areas of Australia many favourable claims have been made about this grass. We have little information as to its suitability to our Queensland conditions. Considering the climatic differences between the winter rainfall areas down south and our Queensland summer rainfall areas, there is no great assurance of a repetition of southern successes here. However, it is considered that a few small plantings on very sandy soil would be well worth trying. Small pilot plots of this grass and other species are useful in obtaining on-the-spot indications of local suitability. Such plantings will provide a nursery seed plot, and so help to reduce the cost of subsequent plantings of those grasses which prove suitable to the local conditions.

Anaemia in Childhood

So often these days a well-meaning friend will exclaim to a parent—"Isn't your child pale?" This usually causes the parents to wonder if their child is anaemic.

Skin pallor alone is not a definite sign of anaemia, but when accompanied by pale lips and gums it can be of diagnostic importance. If parents are worried about the possibility of anaemia, a visit to a doctor will set their minds at rest.

What is anaemia? It is a word often used and frequently mis-interpreted. To understand the term, we must understand something about the blood and its function. Blood is a fluid containing two types of cells—red blood cells and white blood cells—which passes around the body inside tubes called arteries, capillaries and veins. The blood, as a whole, cannot escape from the tubes which are at first, large (the arteries) and then gradually decrease in size and branch repeatedly till they become capillaries, which can be seen only under a microscope. The capillaries join together until large vessels called veins are formed. Between the veins and the arteries, we find a muscular pump known as the heart which forces a jet of blood into the arteries (the forcing causes the pulse).

We Need Iron and Oxygen.

Oxygen is needed to nourish all the tissues of the body. It reaches the tissues via the red blood cells in the blood stream. These cells pick up oxygen from the lungs and take it to the tissues. Blood in which there is oxygen is bright red: blood which has given up most of its oxygen is a reddish-blue colour. Iron and protein form haemoglobin which is situated in the red blood cell and which is responsible for the carriage of oxygen. Haemoglobin is also responsible for the red colour of the blood and it is this which causes lips, gums and skin to have a pink colour. If haemoglobin is low, the lips and gums will be pale; the blood will not be able to carry enough oxygen to the tissues and so they will not grow as well as they should.

Lack of iron in the food will cause lack in the body available for the formation of haemoglobin. To safeguard against this, parents of growing children must make sure that their children's diet is rich in the foods that contain iron, such as meat, egg yolk, dried fruits, parsley. Milk contains very little iron and so a baby does not get very much iron for approximately nine months. Fortunately he receives a good supply of iron from his mother at birth and this usually lasts until he is old enough to take the foods which contain iron. If he is ill during the first year of life, or if he will not take solid foods, he may become anaemic at about nine months of age. Remember your doctor and not your neighbour is the one to ask for advice if you think your child is anaemic. *(Issued by the Department of Health and Home Affairs.)*

Prize Winning Essay—

The following essay won first prize in a competition entered by 21 pupils from Ma Ma and Mount Whitestone State Schools. The author, who is 13 years old, is in eighth grade, and is president of the school milk and cream testing club.

Dairying

By KAY PETERSEN, Ma Ma Creek State School.

Popular breeds of dairy cows in our country are the A.I.S., Jersey, Guernsey, Ayrshire, and Friesian. In Queensland the A.I.S. breed is the most popular.

It is very important that the breed chosen by the farmer is suited to the conditions of the district.

The object of rearing calves is to replace culled cows. When a calf is born it is deficient in Vitamin A. Colostrum, the special food provided by the mother, must be fed at this stage. When the calf is 24 hours old it should be taken from the mother and tied up with a collar and chain in a grassy spot. A calf must be fed on warm whole milk for the first seven days of its life and then can be gradually changed to a skim milk diet. A badly fed calf will develop scours or pneumonia and will remain stunted.

In bad weather it is necessary to provide shelters for young calves.

Calves are not capable of digesting coarse, fibrous foodstuffs and should not be turned out on coarse, mature grasses.

There is an old saying that goes: "A good dairy farmer does not keep cows. The cows keep him." This emphasizes the need for culling. Here the farmer consults his Herd Record Book. In it there are results of monthly butterfat tests of a sample taken from a cow during her lactation period. Things to be taken into consideration when culling are: The age of the cow; her health; the prevailing conditions; and date of calving.

A good sire is essential. On him depends the quality of the future herd. Always choose the son of a proven sire; one whose half-sisters are good producers.

The dairy cow is a creature of habit. She adapts herself to a certain routine and will react unfavourably to any alteration made in it. The person in charge of milking should work to a system. Sticks and dogs should be kept out of the milking yard and as little noise as possible made.

Preparation for milking should always be done carefully. Wash udder, teats and flanks of the cow with water containing chlorine. Always use the strip cup, taking out the milk which is in the teats. In this way it is easier to detect abnormalities in the milk and it also removes any bacteria which may be in the end of the teat.

Do not place the teat cups on the cow until milk let-down has been completed. Remove the cups as soon as the milk flow ceases. Just as it is undesirable to turn a cow out half milked so it is bad to allow the teat cups to remain on the cow too long. Strain on the internal structure of the udder will cause mastitis. The average

Kay Petersen and her pony.

cow will take about three minutes to milk out.

Avoid hand stripping where possible. Heifers can be trained to machine strip from the very first time they are milked.

Always use machines according to the manufacturer's directions.

The attendants in the bails should be suitably attired in boilable white overalls. Their hands must be washed in warm soapy water before commencing milking operations.

For use on dairy farms, seamless buckets and cans are the most hygienic. These utensils must be sterilised after each use.

It is important that all milk and cream be cooled as soon as possible after coming from the cow. Don't allow milk or cream to stand about in open buckets or cans. Where cans of milk or cream are collected by a carrier for transportation to the factory always make sure they stand in the shade. After each milking sterilize the milking system. Once a week completely dismantle the machine and boil all rubber in a caustic soda solution. Replace all perished rubberware.

It is necessary to have windbreaks around pastures to protect cows from the weather. Trees may be planted but in many places use can be made of the natural growth of scrub.

The presence of good water in pastures is essential for maximum milk production. A cow in milk needs 10-15 gallons of water per day. Some heavy milkers need twice this amount.

The most effective method of grazing is strip grazing. The pasture is so divided by electric fences that a cow will get her fill without leaving any stubble. This saves wastage and prevents long stalks from harming subsequent pasture growth.

Harrowing at regular intervals distributes the droppings evenly, thus preventing rank patches.

Popular pasture crops are: Buffel grass, paspalum, panic, lucerne, and clovers.

A popular modern method of storing winter fodder is silage. For storage in a tower silo, the fodder is chopped and fed into the silo by means of a blower. Trench silos are filled with whole or unchaffed material. When the trench is filled, a layer of green grass is placed over the silage and then earth is placed on top in such a manner that water will drain off.

No farm should be without a first aid kit. It should contain the following: Bottle of borogluconate for cases of milk-fever, trocar and cannula in case of bloat; adhesive plaster, a small pair of scissors, boracic acid, and disinfectant for wounds. Tubes of penicillin are included to treat mastitis.

A good dairy farmer is a man who is proud of his heritage and his work. He must have the pioneering spirit so that those who follow him may benefit by his endeavours.